

THE IRON AGE

New York, April 27, 1916

ESTABLISHED 1855

VOL. 97: No. 17

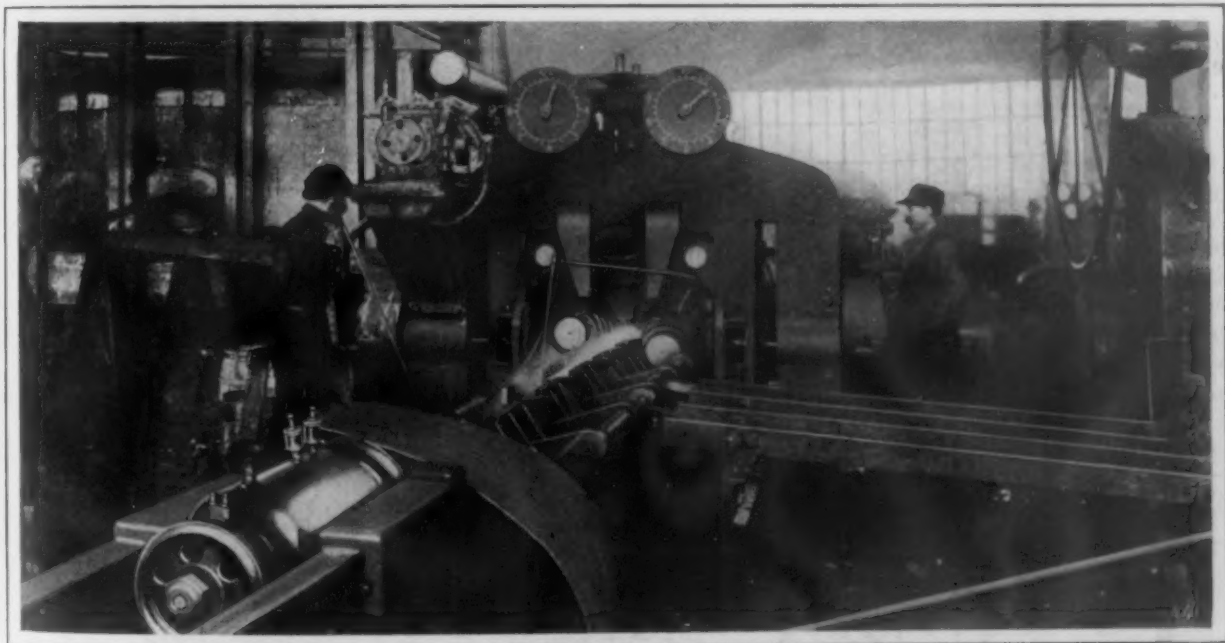
New Electrically Driven Tube Mill

Piercing Mill of a New Type Installed in Timken Plant at Canton, Ohio—A Gravity Feed Furnace and Other Interesting Equipment

Because of its heavy consumption of steel tubing for use in the automobile industry, the Timken Roller Bearing Company, Canton, Ohio, some time ago decided to add to its works a tube mill to roll tubing to supply the needs of its own plant in the manufacture of roller bearings and those of its Detroit allied interest, the Timken-Detroit Axle Company, for making motor car axles. This plant was recently placed in operation, and it is regarded as one of the up-to-date tube mills in the country.

The tube mill occupies a modern type of steel mill building inclosed in corrugated metal and L

The bar stock used is 3 to 6 in. rounds that come from the steel mills in lengths from 18 to 28 ft. Most of this stock is electric steel, although some open-hearth material is used. The bars are cut up in lengths ranging from 23 to 54 in., depending on the size of the tubing to be made. A Mesta shear, capable of cutting squares up to 6 in., is located near the unloading track. The shear is driven by a 75-hp. motor. It has an approach table 40 ft. long with rolls 20 in. wide and a run-out table 12 ft. long. An adjustable stop is provided on the run-out side of the shear.



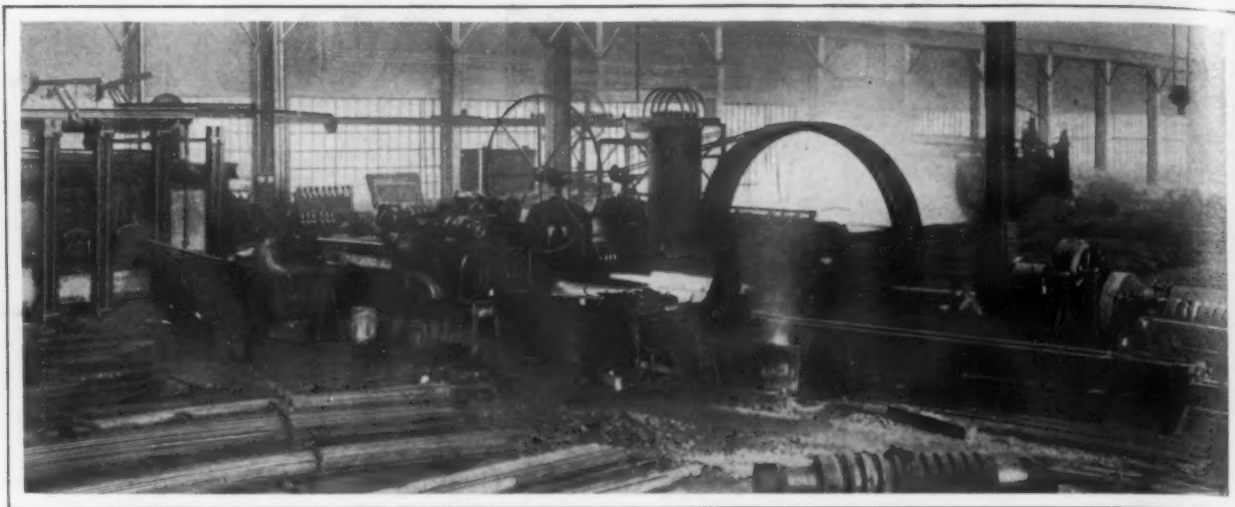
View of the Tube Piercing Mill, Also Showing in the Foreground the Air Operated Equipment that Controls the Piercing Mandrel

shape in plan, the main section being 200 x 100 ft., to which a 60-ft. extension is now being added and a wing 116 x 56 ft. The raw stock, generally known as piercing rounds, is brought into the plant at one end and passes through the various manufacturing processes until the material reaches the opposite end of the plant as finished tubing. A 5-ton Whiting crane spans the main section of the mill building, and with this practically all the handling of material is done.

A railroad siding enters one end of the plant, and the bar stock is placed by means of the crane in the ample raw-stock storage space here provided.

The sheared stock is rolled from the run-out table to a cradle from which it is taken in bundles to the charging end of the heating furnaces at this end of the mill. One of the illustrations shows a bundle of stock being placed on the platform at the charging end of the heating furnace, this platform being built of rails which extend several feet into the furnace.

The furnace is of the continuous gravity feed type and gas fired. The furnace chamber is 40 ft. long and 12 ft. wide. The heated bars are drawn from the side of the furnace, a good view of which is shown in another illustration. As the bars are



General View of the Gravity Furnace, Piercing and Rolling Mills

drawn, those back of them roll forward and additional bars are, of course, put into the furnace at the charging end, so that there is always a continuous row of bars reaching from the charging end to the discharging end of the furnace. The steel, it is found, can be brought to the temperature required for piercing in about 30 min., although in practice it usually stays in the furnace somewhat longer.

On being drawn from the furnace the blanks at a white heat are deposited on an inclined table, on which they roll to the feed end of the piercing mill. This is a new type designed by Richard E. Brock, superintendent of the tube mill. The blank while being pierced passes between two cross reducing rolls arranged for operation at opposing angles, and the inclination of these rolls and the adjustment of the draft are under almost instant control of the operator, who is thus able to make adjustments to suit operating conditions, and to increase or decrease the feed by changing the inclination of the rolls. The rolls are mounted in tilting frames, pivotally mounted in a slidable carrier frame across the bed so that the rolls can be moved inward or outward, toward or from the working pass of the

blank. In the upper portion of each frame is a segmented toothed rack that engages a worm that is direct driven through beveled gears by a small motor on the top of the mill housing. By reversing the inclination of the tilting rolls the blank can be subjected to a series of reversed rolling operations for reducing the size between the same set of cross rolls after the piercing operation, making rapid rolling possible and eliminating reheating.

The rolls are controlled by an operator stationed a short distance back from the front of the mill. This operator also controls the movement of the air-operated piercing mandrel, which travels forward until the die on the end of the mandrel comes in contact with the blank as the latter enters the rolls. As soon as the blank is pierced the mandrel is withdrawn. One of the illustrations shows the piercing mill with the mandrel-operating device in the foreground. From the run-out table at the front of the mill, the pierced blanks are raised by dogs and deposited on the inclined table shown at the right in this illustration. This table is directly at one side of the tube rolling mill, to which the blanks go for the next operation.

The piercing mill is direct driven by an 800-hp.,



Charging End of the Heating Furnace Showing Bar Stock Being Deposited with Crane on Charging Platform



Gravity Feed Furnace for Heating the Stock

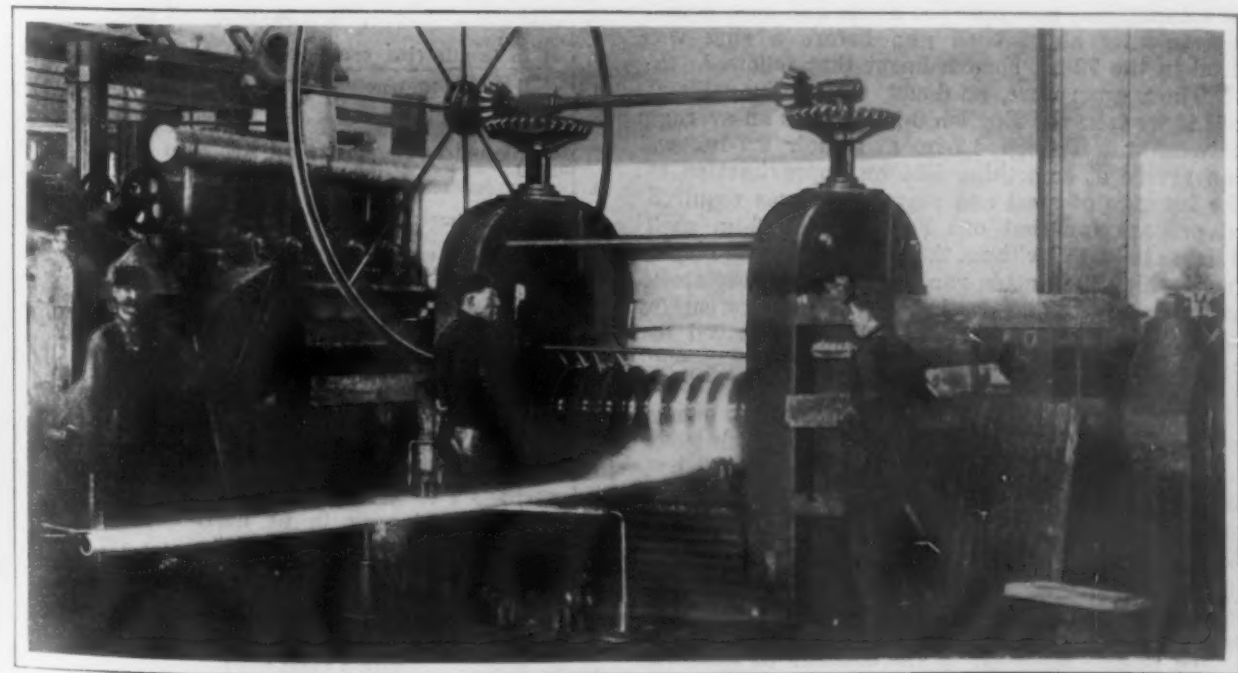
three-phase, 60-cycle, 2200-volt motor operating at 250 r.p.m. The motor is provided with a liquid slip regulator in the secondary. The regulator operates when a load comes on, causing the 30-ton flywheel on the main shaft to carry the load during the piercing operation. This is said to be the first electrical installation of this type in connection with a tube-piercing mill. The drive is through a flexible coupling and cut helical gears that connect the main driving shaft to the spindles of the piercing rolls.

After piercing the blanks are rolled on a semi-automatic 21-in. tube rolling mill, which is provided with two sets of adjustable rolls. The tubing passes through one set in one pass and returns through the other set, one set being raised up out of the way by air control while the other rolls are being used. The tubing is given from one to ten passes through the rolls, depending upon the size being rolled. The tube-rolling mill is driven by 300-hp., three-phase, 60-cycle, 2200-volt motor through a rope drive from a driving pulley direct connected to the motor, the double system of two sets of ropes being used for the drive. The piercing mill and tube-rolling mill were built by the William Tod Company, Youngstown, Ohio. The mill drive and other electrical

equipment were furnished by the Westinghouse Electric & Mfg. Company.

After rolling the partly made tubing goes to a special heating furnace, where one end is heated and then hammered down in a 1200-lb. steam hammer so that it can be pulled easily into the dies in the drawing benches. The hammer was furnished by the Chambersburg Engineering Company, Chambersburg, Pa. It is then immersed into an acid tank, of which there are two for pickling, and after that into a so-called dope tank in which it receives a coating of tallow preparation before going to the annealing furnaces and drawing benches.

There are two single and one double drawing bench, the former driven by 50-hp. motors and the latter by a 75-hp. motor. The metal is soft when it reaches the tube-rolling mill, but the drawing hardens it so that after each drawing operation except the final one it is annealed, pickled and doped. The number of passes in the drawing benches ranges from one to five. There are two annealing furnaces, the dimensions of their chambers being 8 x 30 ft. After the drawing is completed the tubing is straightened, the ends are cut off and it is cut to length. Two straightening machines are



The Tube Rolling Mill

provided, one of a bulldozer type furnished by the Williams, White & Co., Moline, Ill., and the other a roll straightener furnished by Abramson Engineering Company, Pittsburgh. For cutting off there are a 4-in. and a 6-in. Espen-Lucas cutting off machine, a 2½-in. Hendey cutting off machine and a 3-in. Davis machine. In addition there are for this purpose three power hack saws and a 1½-in. cutting off machine.

At one end of the mill there are two wire drawing benches and three wire straightening machines,

these being used for drawing 5/16 to 5/8-in. wire used in the manufacture of roller bearings. The wire-drawing equipment was furnished by the F. B. Shuster Company, New Haven.

Waste heat from the heating furnace is utilized by means of a 250-hp. Wickes tubular waste-heat boiler, about 75 to 100 hp. being thus developed. This steam is used for operating the steam hammer, for pickling vats and for heating purposes. Electric power is furnished by a local commercial light and power company.

Cost and Profit in Shells Approximated

Number of Men Required — Saving of Steel Possible in Rough Blanks—Inference Regarding the Volumes Needed for Modern Warfare

BY ENOS MOORE

WHEN one sees an acre or so of finished shells, standing on end and glistening in the early morning sun, awaiting shipment, the product of one night's work in a single shop, the practical question quickly arises as to what may be done with the total output of the many factories engaged in the production of that one article.

At a recent meeting on the subject of preparedness, Mr. Powell, an American war correspondent,

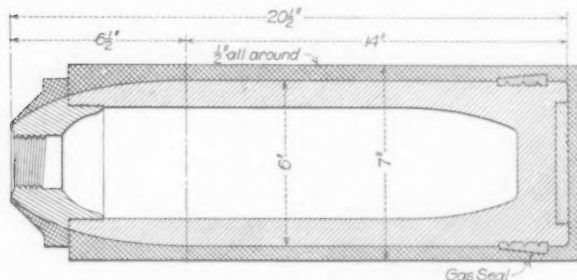


Diagram to Show Need of Closer Forging Work

speaking of the fighting in France, said that it had taken four months to locate some 3000 guns on a battle front of 15 miles, preparatory for the battle of Champagne, and that 600 shells had been placed conveniently about each gun before a shot was fired in the 72-hr. bombardment that followed.

Those guns were, no doubt, of varying caliber; but if we take the English 6-in. shell as an average between the French 4.7-in. and their 8.7-in., we can arrive at something like an approximation to the tonnage of steel and copper that was required to prepare for that one battle. This 6-in. shell finishes to 90 lb., without the loading; but the blanks from which it is made run to 135 lb. for the steel, and 4 lb. for the copper bands. This represents a loss of 49 lb., half of which should be saved by neater forgings, as the accompanying sketch will illustrate.

There are a great many of these body blanks that are shy of material on the inside, which leads to what is commonly known as "black spots," but the wear and tear of roughing off that extra inch of steel upon the outside costs time and money, and the steel itself, after allowing for the value of the turnings, comes to something over \$1,000 per day for a 1000-shell shop, and half of that should be saved.

To revert, however, to the tonnage of material employed in the battle referred to, a simple calculation will show that to make the shells there was

something like 3600 tons of copper used, and 121,500 net tons of steel, which, according to the newspaper reports of the daily output of the Bethlehem Steel Company, would have occupied them for a period of 2 years. That is, on shells. (Three thousand guns at 600 shells each, or 1,800,000 shells in all; at 3000 per day, the total represents 600 days' production.)

Even this sidelight upon the consumption of material is not satisfying, and when we consider the details involved in the fabrication of the shells we are worse confused over the exactness required upon an article that is to be blown to bits as quickly as opportunity will permit.

OPERATIONS FOLLOWED IN ONE SHOP

It is conceivable that different shops follow different methods in the finishing of shells, but let me specify here the program that is now being followed by one shop of my acquaintance which has a capacity for something more than 2000 shells per 24 hr. These people began with a list of 28 operations, and it is doubtful if they would recognize the following list of what they are now doing, so many and so frequent have been the changes.

- | | |
|---|------------------------------------|
| 1. Unload forgings and store. | 19. Groove and undercut. |
| 2. Distribute. | 20. Wave for bands. |
| 3. Cut to length (the open end). | 21. Inspect and chip. |
| 4. Center, true with bore. | 22. Cut base to length, and weigh. |
| 5. Rough turn. | 23. Bore for base plates. |
| 6. Inspect for rough diameter. | 24. Thread base. |
| 7. Bore, counter-bore and thread. | 25. Machine base plates. |
| 8. Inspect for black spots, depth, etc. | 26. Inspect for size. |
| 9. Grind out imperfections. | 27. Apply base plates. |
| 10. Drill and tap for screws. | 28. Roll back ends and face. |
| 11. Machine fuse sockets. | 29. Weigh and cut to length. |
| 12. Inspect sockets. | 30. Wash and dry. |
| 13. Apply fuse sockets. | 31. Inspect. |
| 14. Grind out sharp edges. | 32. Sand blast inside for rust. |
| 15. Finish turn shell. | 33. Varnish, with spray. |
| 16. Inspect for eccentricity. | 34. Dry in steam oven. |
| 17. Replace loose sockets. | 35. Apply copper bands. |
| 18. Repair (re-turn noses mostly). | 36. Machine gas seals. |
| | 37. Size tap fuse holes. |
| | 38. Stencil. |
| | Final inspection. |
| | Store in bond. |
| | Pack for shipment. |

I do not offer this as an ideal schedule of operations but as a fair list of what is now being done in a large shop, as a basis for estimating the cost; and perhaps I may be permitted to observe that I know it to be wrong in at least one important respect. To turn the nose of a shell off for eccentricity does not remove anything but the appearance of lopsidedness; and the whole expense of repairing for that fault should be done away with.

THE LABOR COST

Naturally the greatest demand exists for skilled

mechanics, and much of the evils complained of are charged to green hands, but in this case it is a fault of the process. There is this that can be said of the green hands. When they are too much abused they will take it out upon the machines, and wherever there is anything that will break under the influence of a 2-lb. hammer, it will usually be found broken. Out of a hundred new machines that are being operated by unskilled labor there will not be one with a full set of wrenches after the first few months, and almost all of the handles will be broken off.

Upon the basis of the number of shells that an average mechanic can turn out in 10 hr., which is known for the most of the operations above noted, I have made out a list of the machine tools required for 1000-shell capacity per 24 hr., and apportioning mechanics and helpers to those and the special machines, such as washers, tire setters, etc., together with the truck men, I find that I am able to place 308 mechanics and 230 laborers.

This is not so many in proportion to what is now being done, but I will offset that with a little better pay, so that allowing \$5 per day for the mechanics, and \$2 per man for the laborers, we find that for 1000 shells capacity per 24 hr., the labor will amount to \$2 per shell.

Add to this the cost of the material, under prevailing prices, and we get a 6-in. shell at a shop cost of \$8, to which the overhead and the profit must still be added. I have known quite a number of large manufacturing establishments where 100 per cent of the shop cost had to be added to cover overhead, and if we add that in this case we shall not be far wrong.

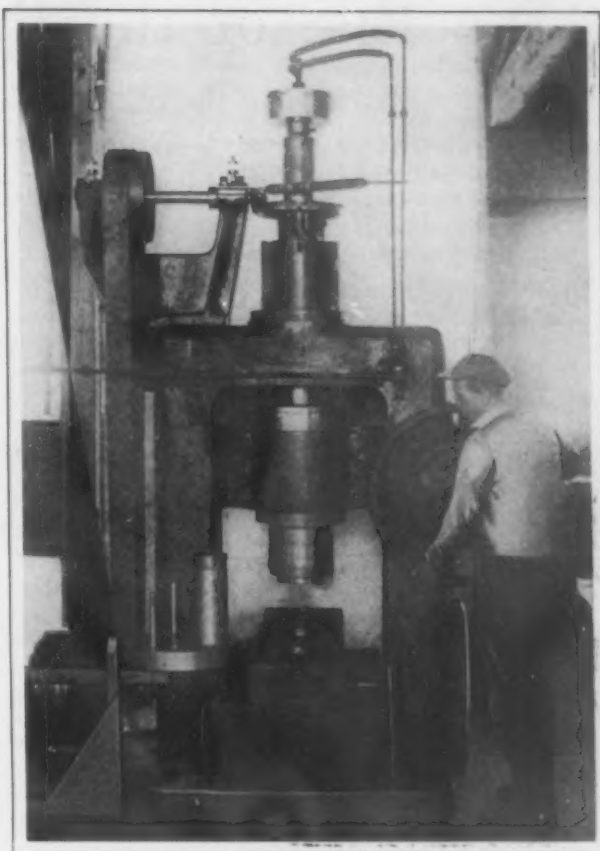
From a recent number of THE IRON AGE I have noted that a late quotation on American 6-in. shells was \$19.85, and this would leave us very nearly \$4 profit per shell, if my calculation is right.

As a matter of fact, with the economies that I have noted, on neater forgings and a change that will do away with repairs, so called, there should be a clean \$5 profit on every 6-in. shell turned out, and the same proportion for the other sizes.

Inverted Projectile Boring Machine

The Dunlap Machinery Sales Company, Dayton, Ohio, has brought out a vertical boring machine for shells up to 6 in. in diameter. It differs very materially from the standard type of boring machine in that the shell is rotated while the boring tool is stationary, and that the shell is inverted above the boring tool. In the inverted position chips drop out as they are detached, thus minimizing interference with the cutting tool.

The chuck is of the pneumatic type, and the spindle is cored so that the chuck jaws for any diameter of shell up to 6 in. can be inserted. While this arrangement necessitates the enlargement of the lower end of the spindle, it is also relied upon to give a large bearing surface, which is 16 in. long by 14 in. in diameter. The latter dimension is for the chuck for 6-in. shells and is 2 in. less for 5-in. shells. The larger diameter is, of course, at the bottom and the bearing tapers upward, this construction being relied upon to give a full seating of the bearing when in operation. The spindle is of semi-steel and the bearing is of hard babbitt metal having means to compensate for wear. The handwheel at the front of the machine provides for hand control of the spindle feed, or if desired, power feed can be used. With the latter six changes, ranging from 0.007 to 0.053 in. per revolution of the spindle are available. A quick movement either



A Machine for Boring Shells Up to 6 In. Diameter in Which the Tool Points Upward and is Stationary While the Work Revolves, thus Permitting the Chips to Drop and Clear the Tool

up or down, which is controlled by hand or power, is provided to adjust the tool or spindle. A counterweight facilitates the movement of the spindle.

The platen is of heavy construction, and is carried in ways which are cast integral with the base of the machine. In the platen are three tool holes, and a platen centering device is furnished to center each tool with the spindle. After this is done by a heavy tapered pin the platen is locked in place securely by long tapered gib to relieve the centering pin of any strain.

The machine is driven by a 6-in. double belt from a lineshaft at a speed of not over 3600 ft. per minute. From the lower countershaft the power is transmitted to the spindle through a second belt and set of gearing. The ratio between the speeds of the lower countershaft and the spindle is 15 to 1.

The floor space occupied measures 50 x 84 in., and the weight is 10,000 lb. The equipment furnished includes a pump and piping for lubrication purposes and a pneumatic chuck and the necessary piping, together with the wrenches required to make the adjustments.

The Defiance Machine Works, Defiance, Ohio, reports furnishing the special tools used for the manufacture of military rifle stocks in the plants of the Remington Arms Company of Delaware, Eddystone, Pa.; the Remington Arms & Ammunition Company, Bridgeport, Conn.; the Hopkins & Allen Arms Company, Norwich, Conn., and the Ross Rifle Company, Quebec, Canada. Additional equipment has been furnished to the Winchester Repeating Arms Company, New Haven, Conn., and the New England Westinghouse Company for its Springfield, Mass., and Meriden, Conn., plants. Machinery used in the manufacture of artillery wheels and military vehicles used in America, Europe and Asia has been built by this company.

The Rise of the British Iron Industry

Taking the Initiative Has Been Britain's Main
Leverage—While America and Germany Lead,
Some Advantages They Have Not Overcome

BY H. H. CAMPBELL

The German chancellor in a speech before the Reichstag declared that England's doom was sealed and that "Mene, Mene, Tekel, Upharsin" was written on the wall. Without a doubt he had in mind the great change that has taken place during the last half century in the relative position of Germany and Great Britain as steel producers. In 1880 Great Britain produced twice as much steel as Germany, while in 1910 Germany made more than twice as much as Great Britain; in the eighties Great Britain made 33 per cent of all the steel in the world, while to-day it makes only 11 per cent.

This comparison, however, is not quite fair, for during our Civil War the United States put a high protective tariff on steel and soon afterward entered on an era of railroad expansion. Germany did the same after the Franco-Prussian war, while Russia, Austria, France, Italy, Spain and Canada have all enacted protective tariffs and have built up steel industries to supply their own needs, so that it could hardly be expected that England would make the same percentage of the world's output to-day that she did half a century ago.

But it is also true that Germany has increased her production more than can be accounted for by regarding her own needs only; while the protective tariffs just mentioned count against Germany just as much as against England. We should try to find out the causes of the early predominance of Great Britain, and to do this we must look up a little ancient history.

IN THE EIGHTEENTH CENTURY

The building of the first blast furnace in 1340 for making pig iron marked an epoch in the history, not only of the iron industry but of the civilized world, and the new metal rapidly came into use, particularly for cannon; but until late in the eighteenth century wrought iron and steel were made in practically the same way as in the time of the Greeks and Romans. An iron furnace was little more than a hole in the ground, about 2 ft. square and 2 ft. deep, which was supplied with charcoal and with either iron ore or pig iron, the resulting product being a lump of pasty iron which was pulled out and worked into shape under a hammer. This dependence on charcoal for fuel put a limit on the size of the plant, because the trees in the immediate vicinity would soon be cut down and then it would be necessary to haul the fuel a long distance.

In the last half of the century there was a succession of revolutionary inventions. In 1768 Watt invented his improved steam engine; in 1783 the first grooved rolls were operated, and in 1784 puddling furnaces were started, using coal for fuel. Since a coal mine can supply an indefinite amount of fuel at one point, and since the puddling furnaces and the rolling mill were complementary to each other, it is clear that with the steam engine we have all the elements necessary for a large iron works.

THE FUEL QUESTION

Iron ore occurs in a hundred places in England, while coal is abundant and of the best quality, and

a century ago the fuel supply was the paramount issue, owing to the large quantity used per ton of iron. At that time no coke was manufactured, and the fuel was either charcoal or raw coal. When charcoal was used about 5 tons was required for every ton of pig iron, while to-day furnaces in Sweden consume a good deal less than 1 ton. With coal it took from 8 to 10 tons to smelt the ore for a ton of pig iron, while to-day the coke needed to do the same work can be made from 1½ tons of coal.

We are not concerned just at this moment with the causes that have brought about these economies in fuel consumption, but we are interested in the facts. One hundred years ago, counting from the time that the ore and fuel were put into the blast furnace until the final horseshoe, wagon tire, musket or wrought-iron nail was made, we may say that from 15 to 30 tons of fuel was needed for every ton of finished merchantable product, and therefore the natural situation of an iron works was at the coal mine. To-day we see a steel works starting at Duluth, a thousand miles from the fuel, a project which would not have been undertaken a century ago, for it would have been cheaper to carry 2 tons of ore to the coal than to carry 20 tons of fuel to the ore.

ENGLAND'S OPPORTUNITY

We have seen that great advances in the methods of manufacturing iron were made in England during the last half of the eighteenth century, and there is no doubt that these new methods would soon have spread to the continent if nothing unusual had happened; but the French Revolution burst forth and for a long time anarchy reigned in Europe, so that factories and iron works could not be started, and for nearly 20 years the continent was buying everything from England, just as to-day the world is buying from the United States. Napoleon tried to interfere with this trade of Great Britain by declaring an embargo, but at that very moment his own soldiers were wearing shoes and clothes and carrying muskets made in England. For many years after the wars were over England had a monopoly of the trade of the world, because there were no factories in Europe and no shops where engines, boilers or machinery could be built, and there were no skilled factory workers. England had a start, and that is everything.

Conditions will be quite different a year from now, for Europe is fully equipped with factories sufficient for her needs. The workshops in England are in full operation to-day; in Germany, Russia, Austria and Italy they are running more or less regularly, while in France and Belgium, although operations are interrupted, the factories themselves are uninjured. They will start again just as soon as peace comes and we will not have the monopoly that England enjoyed a hundred years ago.

AFTER THE AGE OF WROUGHT IRON THE BESSEMER ERA

Railroads came into existence in 1825, and immediately there was an enormous increase in the production of iron, the output of pig iron rising

from 375,000 tons in 1800 to 4,422,000 tons in 1850. Hardly any steel was made at that time, for although the process of making crucible steel had been invented as early as 1740, this was only used for high-priced cutting tools; the metal in common use for rails, boiler plates, forgings, structural shapes, horseshoes, wire, bolts, nails and a thousand and one articles made in the village blacksmith shops was wrought iron.

In 1856 Bessemer blew cold air through liquid iron, converting it into steel, and it was at once found that the ordinary ores of England were not fitted for the new process because a low content of phosphorus was required and such ore had to be brought from Spain, Algeria and the Island of Elba. This might have been a blow to the supremacy of Great Britain, because either France, Belgium or Germany could have imported this ore, but England had taken the initiative, just as she had a century before, when the fundamental inventions of the iron industry were developed. British manufacturers were making Bessemer steel in considerable quantities before the rest of the world was awake, and they pre-empted in large measure the ore mines of northern Spain, so that Great Britain has been able to hold her place in the world. There were other circumstances which contributed to success, and as these conditions are still in force, it will be well to say a word about them.

MERCHANT MARINE

It is frequently said that our Civil War drove our flag from the ocean. This is not a correct statement, for long before 1860 Great Britain had begun to build iron steamships, and if our war had not come the sailing ship would have been displaced. Everybody to-day advocates building up our merchant marine, but we will always be at a disadvantage compared with England and Germany, for those countries must send abroad for wheat, meat and cotton, and it will be just as well to carry an outbound cargo from Europe as to sail in ballast, so that the return cargo may be called upon to pay the freight on both trips. England also has a great advantage in possessing colonies, for it is natural that the people in Canada, Australia and South Africa should prefer goods from their home country.

The situation of the United States is just exactly the opposite, for we do not import bulky commodities, with the exception of a little iron ore from Cuba, Sweden and South America. In the long run the outbound cargo must pay the freight, so that in the last analysis Europe can export more cheaply than the United States.

FOREIGN EXCHANGE

Away back in the time of the American Revolution, England began to have difficulties in making collections in her foreign trade. When such questions arise in this country we appoint a committee of Congress and pick out men who do not even have a bank account. Under similar circumstances France would appoint a committee of lawyers, while Germany would consult professors of political economy; but England did none of these things.

The whole matter was put into the hands of Lord Chief Justice Mansfield, and he appointed a jury of London merchants, who formulated the system under which England to-day carries on the financial transactions of the world. A bill of exchange is the most illogical instrument every devised. If a Hottentot in Africa should write an order commanding a Chinaman in Canton to pay \$1,000 in gold to an Esquimaux in Greenland, it would be a perfectly valid bill of exchange as far as form is concerned.

The fact that there was no "value received" would have nothing to do with the case, for these thoroughly practical business men disregarded this technicality, although they put in the words for the sake of looks.

Our Congress cannot do things this way. In 1914 a law was passed containing many things which are to be commended, but when provision was made for the establishment of reserve banks in foreign countries, so many restrictions were imposed that these banks would be of little use if they were started. Fortunately Congress did allow our national banks to establish branches in foreign countries, and this plan is now being carried out and we are certain to profit greatly by this arrangement.

FOREIGN INVESTMENTS

It is stated that at the beginning of this war, Great Britain had \$20,000,000,000 invested in foreign countries which brought in a revenue of \$1,000,000,000 every year, more than overcoming a huge unfavorable visible trade balance arising from importations of foodstuffs and of raw materials like wool, cotton, iron ore, lead and copper, which must be brought in from the outside world. The highest authorities differ widely as to the amount invested in the United States, but roughly speaking it may be placed at \$5,000,000,000. The British chancellor of the exchequer should know as much about the matter as anyone, but in December, 1915, he said before Parliament that the American securities owned on that date in Great Britain were between \$1,500,000,000 and \$4,000,000,000, which is allowing a pretty fair margin of error. This, of course, was after England had returned about \$1,000,000,000 of our securities during the year 1915.

These foreign investments cover the whole field of human activity, and if a thousand years from now some investigator should find a record of the companies listed on the London Stock Exchange, he could reconstruct our world. There are corporations mining zinc in Australia and diamonds in South Africa; washing gold in Siberia and tin in the Straits Settlements; building irrigation canals in Egypt and India; operating railroads in Argentina or the Soudan; running rubber plantations in Brazil and Borneo, and conducting harbor improvements in Singapore. Every one of these companies opens a market for British goods.

The American International Corporation has been formed in New York to finance just such enterprises in foreign lands; but this company can only act as an intermediary. If American manufacturers are to build an electric light plant in Brazil, our people must buy the securities of the company. If they do this, then the United States can do its share in the work of developing the countries overseas; but if we are so provincial that we will not buy foreign securities, then after the war Great Britain will resume business at the old stand.

SUMMARY

We have seen that Great Britain gained its place in the world partly through having supplies of ore and coal and partly through the inventive genius of her people, who more than a century ago inaugurated fundamental improvements in the iron industry, while the Napoleonic wars gave a monopoly of the trade of the world for long years, this commanding position being held until recently.

The invention of the Bessemer process might have been a disadvantage to England if her people had not possessed initiative and enterprise; but our Civil War and the Franco-Prussian conflict disturbed the internal development of her most for-

midable rivals and aided her just at this critical time. Her merchant marine, an admirable system of foreign exchange and large oversea investments, both in her colonies and in other countries, all contributed to her predominance.

We must now consider the situation as it exists to-day, and find out what supplies of raw material are available and whether labor conditions are favorable, before we know whether Great Britain is to maintain her place in the world. This will require another article.

TWO NEW RIFLE MACHINES

Two-Spindle Machine for Drilling Barrels and One for Cutting Rifling Grooves

A deep-hole drilling machine designed for the rapid production of rifle barrels and a rifling machine have recently been brought out by the International Engineering Company, Society for Savings Building, Cleveland, Ohio. The drilling machine is equipped with two spindles which work independently of each other and have a drilling capacity of $1\frac{1}{4}$ in. per minute each, giving the machine a capacity of three rifle barrels per hour. In drilling the work rotates, the barrel forging being held in a friction clutch in the headstock spindle. The feed to the carriage in which the drill is held is through gears and a splined shaft. The drill is of the standard type used for gun-barrel work, with an oil hole through the center and a groove in the side through which the chips are carried out by the cutting compound. As the drill is long and thin it is supported in a rest. One end of the work is held inside of the chip box shown between the headstock and drill support. As the drill enters the work the oil and the chips pass down through the bottom of the chip box into an oil pan beneath.

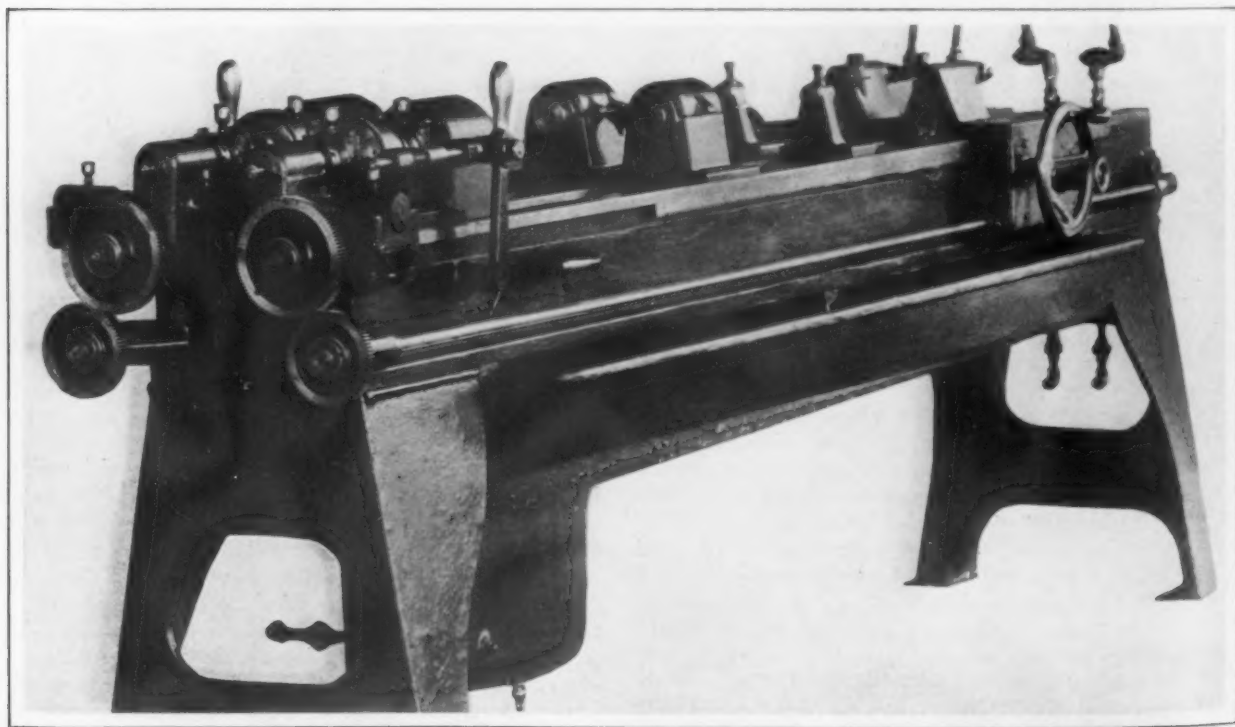
The spindle drive is through a pulley and clutch back of the spindle. A trip mechanism is provided so that when the drilling operation is completed the carriage is stopped by the automatic shifting of the clutch, thus enabling the operator to handle more



Barrel Rifling Machine in Which the Bar Is Moved Along the Bed by a Lead Screw and the Work Is Indexed by a Cam and Dog Arrangement After Each Stroke of the Cutter Bar

than one machine. The starting and stopping mechanism is easily accessible to the operator, so that the machine can be started and stopped quickly. Instead of having a telescopic tube the lubricant is supplied through a universal-jointed tube connected to the carriage as shown. The machine is not equipped with a pump, the oil supply coming from a separate pumping system under 500 to 1000 lb. pressure. The machine is strongly and compactly built, being $127\frac{1}{2}$ in. in length and 28 in. in width.

The rifling machine is designed for simplicity in operation and for accuracy and high speed in rifling. The rifling bar is mounted on the spindle of the carriage, which is moved along the bed of the machine by a lead screw located in the lower



A Two-Spindle Deep Hole Drilling Machine Capable of Producing Three Rifle Barrels per Hour

part of the bed, the drive being through two pulleys, one for forward movement and the other for reverse, with an idler pulley between. The lead screw by gears actuates a splined shaft above the lead screw that meshes with other gears which produce a reciprocating motion of the tool spindle, giving the tool the proper spiral movement and forming grooves in the barrel. When the cut is finished the carriage strikes an automatic belt shifter, which causes the reverse movement. Four and sometimes six grooves are cut in a rifle barrel, and in cutting these grooves it is necessary to index the work after each stroke of the cutter bar. This is effected by means of a cam and dog.

An interlocking clamp on the work spindle makes it possible to remove the barrel for examination and replace it in the identical position from which it was removed so that the tool will be in proper register therewith. Adjustable thread studs are provided for taking up wear on the ends of feed screw and spline shaft. The tool feed is arranged so that either a hook or scraper cutter can be used on either the push pin or screw feed.

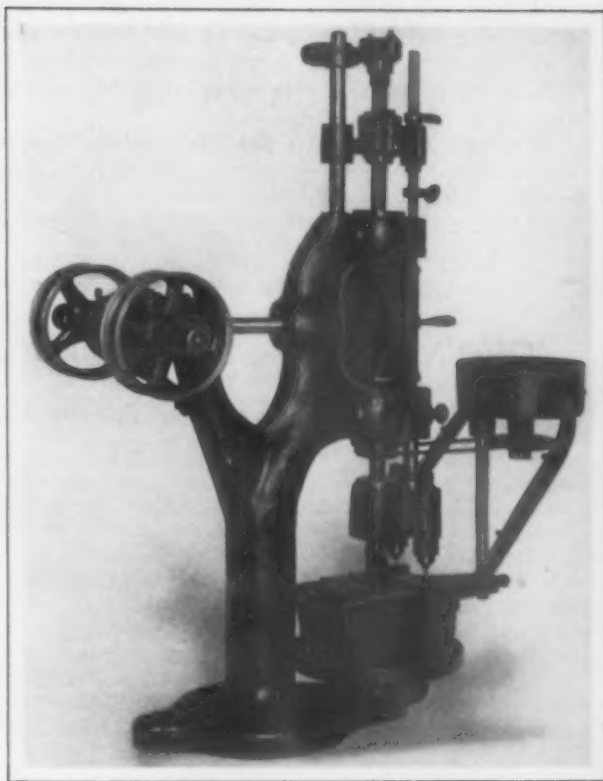
A handle for operating the machine manually is located centrally to the barrel spindle, making it possible for the operator to readily observe the tool when entering and leaving the barrel at both ends. The shifting handle is conveniently located on the side of the machine, and with this the operator can instantly stop or reverse the movement of the tool carriage. The lubricating system is similar to that provided for the rifle drilling machine. A drip pan is provided which extends the full length of the machine. The machine occupies a floor space of 32 in. x 10 ft., and weighs approximately 2300 lb. When driven at normal speed it is said it will rifle one barrel in from 10 to 15 min.

Automatically Tapping Two Nuts at the Same Time

An automatic tapping machine designed particularly for tapping nuts for automobile spark plugs, but which can be used for tapping any small hexagon or square nuts up to 10-24 in size, has been brought out by the Poese Machinery & Mfg. Company, Cleveland, Ohio. This machine is similar to the company's tapping and countersinking machine described in *THE IRON AGE*, Sept. 2, 1915, except that it is equipped with a multiple head, hopper feed and special fixtures for holding the nuts while they are being tapped, so that it automatically feeds, grips and taps two nuts at a time. The nuts are fed into two slides connecting the hopper with the tapping fixture, as shown in the illustration, by a disk in the bottom of the hopper plate driven from the spindle. The two outlets from the hopper are so formed that the nuts enter the slides properly sorted.

At the bottom of the slides the nuts are automatically pushed under the taps by a slide over the table operated by a cam that is actuated from the spindle. This slide grips the nuts, a compensator on one side taking care of the difference in sizes of nuts to be tapped. As two nuts are pushed under the taps, those just tapped are shoved forward and dropped to a pan beneath the machine. After the two nuts are tapped the grip is released by an upward motion of the cam, the slide being drawn back by springs.

The taps are fed to the work by lead screws and nuts of the proper pitch at the top of the machine. After the holes are tapped the machine reverses automatically and the operations are re-



A Two-Spindle Automatic Machine Capable of Feeding, Gripping and Tapping Two Hexagon or Square Nuts Simultaneously

peated. While the illustration shows the machine with a double-pulley drive providing two speeds it is also being built with a single-pulley drive. This machine is tooled up for tapping spark plug nuts, but it can be equipped with other fixtures for other tapping work. The machine is 33 in. high and has a clearance of 4½ in. from the tapping spindle to the column. The driving pulleys are 6 in. in diameter.

The machine is of simple construction and is designed for very rapid and economical production where large quantities of small nuts are to be tapped. It is stated that its capacity is 2000 nuts per hour, and that one boy can take care of five machines. About all the attention that is required is to keep the hopper supplied with nuts.

British High Speed Steel Scrap

All British high-speed steel scrap, short ends, etc., are to be taken back by makers of high-speed steel according to arrangements made by the Ministry of Munitions. The prices fixed are: 5d. (10c.) per lb. for turnings and 6d. (12c.) per lb. for bar ends, delivered at steel works, and all is to be sent back so far as possible to the maker who supplied the original. When this is not possible the scrap is to be returned in proportion to the quantity of steel originally received. It is to be packed in suitable barrels or cases and must be free from all foreign substances, especially other kinds of steel. Turnings are stipulated to be returned as soon as a reasonable amount has accumulated and before they have rusted solid, scrap in that condition being practically worthless. Disposition of high-speed steel scrap through any but authorized channels is illegal.

The Chambersburg Engineering Company, Chambersburg, Pa., has posted notices of an increase of wages of 10 per cent, effective May 1. Apprentices are excluded, but will be cared for by the bonus system, each apprentice receiving a bonus of \$60 a year, or \$240 for the full time for receiving a trade certificate.

Organizing for Industrial Preparedness

Big Part for Engineers—Little but Important Place of the Government—Specifications and Standardization and Men and Management

THAT a stupendous amount of work would be the portion of the engineer in organizing the resources of the country for war was forcibly shown in the discussion of the paper, "Organizing for Industrial Preparedness," presented by Spencer Miller* before the New Orleans meeting of the American Society of Mechanical Engineers, April 12-14. The discussion covered, among other topics, the subjects of machine tools, jigs, gages and other minor equipment, standardization, transportation, men, management and organization, specifications and a host of other items of greater or less importance. Judging by the attention given to the various subjects, those of the greatest moment were: The organization of the skilled workmen and engineers of the country, so that their services will be available at an instant's notice to supply munitions; the standardizing of the machine tools of the country; the supply of an adequate quantity of small tools, jigs, gages and fixtures for arms and ammunition manufacture, and the establishment of standards of efficiency in the civilian adjuncts to the army and navy.

Machine Tools

That the normal supply of machine tools in the country would be totally inadequate for the needs of war was shown by L. P. Alford, of the *American Machinist*. The excess of the exports of machine tools in 1915 over the exports of other years is a small measure of the demands that war would make on the machine shops. The highest yearly total of machine tool exports for any one year prior to the war was about \$16,000,000, while in 1915 they amounted to \$42,000,000, notwithstanding that the normal annual demand of nearly \$3,000,000 for Germany was absent. The machine building industry is the backbone of all offensive or defensive warfare of the present day. The normal surplus of \$15,000,000 worth of tools shipped abroad in peace times would be kept at home in the event of war, but these tools would have to be supplemented by purchases abroad, provided we were not involved in a European war. The experience of the countries now at war furnishes a guide as to the methods to be pursued by the United States. From this experience Mr. Alford establishes the following principles for standardizing and procuring tools in organizing for industrial preparedness.

1. Organize at once in skeleton form an industrial committee to control standardization, design and preparation of machine tools for the production of American munitions.

*This paper was published substantially in full in *THE IRON AGE*, March 23, 1916.

To prepare the drawings for the 17 sizes of shells now used by the army, together with the drawings for the gages, jigs, tools and fixtures, 50 engineers and draftsmen would be needed for 50 weeks. For a daily production of 200,000 rounds of ammunition of this character, it would be necessary to equip 100 factories, each employing 2000 men. To make the gages, tools and fixtures would require 800 well-trained men for 5 years in well organized factories.—Frank O. Wells.

2. Through joint action of this committee, the American Society of Mechanical Engineers and the National Machine-Tool Builders' Association, standardize the details of regular machine tools and design whatever additional special machine tools may be necessary for the rapid and economical production of American munitions.

3. Immediately on the outbreak of war, prohibit the exportation of any machine tools from the United States.

4. Immediately on the outbreak of war prohibit the importation of any machine tools into the United States except

It would take at least 1000 tool makers one year to furnish jigs, fixtures and small tools for the output of 1000 rifles per day. There are 2500 to 3000 first-class gage makers in the country.—K. A. Juthe.

under license and control of the committee mentioned under section 1 above.

5. Order all machines abroad through this committee or its representatives in the capitals of Europe, and entrust these men with the responsibility of securing the desired deliveries and quality.

6. Order no machine tools abroad except to standardize American designs, either for the complete machine or the essential details as the committee may determine.

The machine tools that were shipped abroad for munition work divide naturally into three classes: 1. Simple plain machines that were standard before the war with certain manufacturers or have been designed and built under the stress of the foreign demand. 2. Regular machine tools of a more highly organized grade, particularly automatic machines, that were the standard product of some manufacturers before the war. 3. Special tools developed for some operation or series of operations in the manufacture of some detail of munitions. These group into: a, lathes for the turning of the outside of shells; b, lathes for boring shells; c, lathes for waving, grooving and undercutting shells. The greatest volume of exports was comprised in the first class, and in both this and the third class simple lathes predominated.

The original paper by Mr. Miller showed the necessity of standardizing machine tools. Concerning this Mr. Alford offered the following principles, which were presented by him several years ago in a paper before the National Machine Tool Builders' Association, as a basis for the standardization:

1. Standardize corresponding designations and capacities, and establish a method of power rating.

2. Standardize devices for holding cutting tools.

3. Standardize devices for holding work and fixtures.

4. Standardize operating movements.

5. Standardize parts concerned in the setting up of machines, with reference to the permanent shop equipment.

6. Accept the geometric progression as a fundamental requisite in the design of feeds and speeds.

Jigs, Gages and Fixtures

Closely allied to the machine tool equipment necessary in war time is the supply of gages, jigs and fixtures that are required for the production of munitions in large quantities. The importance of these was not at first realized by those manufacturers who received the earlier contracts at the beginning of the war, but the discussion of this point gave ample evidence that the engineers, at least, are now fully alive to what the necessities will be in the event of war.

JIGS AND GAGES FOR RIFLES

The magnitude of the task of equipping plants to supply the needs of the United States in small arms alone was shown in the discussion of Fred. E. Rogers, editor of *Machinery*, who said in part:

There are about 800 principal machine operations involved in making the parts of the simplest military arm, including the wood stock and hand guard. Many of these operations require special machinery and practically all the parts must be held in jigs or fixtures during the machining operations. When we consider the fact that to provide for an army of 1,000,000 men, from 2,000,000 to 3,000,000 rifles are required, the size of the task of equipping an army of a million with shoulder guns alone becomes apparent. What the condition of this country would be in a sudden emergency, we can only guess.

Mr. Rogers also presented as a part of his discussion the order of operations on the receiver of a

The Government should be the general contractor and let only sub-contracts. The small shop will not be afraid of the work, because it will be simple, both financially and mechanically.—
H. V. Haight.

Spanish Mauser rifle. In the list were 55 separate operations, involving the use of 22 distinct types of machines. Commenting on this list, Mr. Rogers said further:

Several hundred jigs are required for each unit of a plant producing 200 rifles daily, and the same applies to the gages. All these data [of operations] must be prepared by experts, but considerable experiment is always required before satisfactory results can be obtained. That such elaborate plans pay is known from the fact that a rifle complete with strap, bayonet and scabbard can be produced with about twenty man-hours of labor.

What it means to furnish these gages can be comprehended from the facts contributed by K. A. Juthe, chief engineer of Wheelock, Lovejoy & Co., Cambridge, Mass., who said:

It will take at least 300 first class gage makers six months to furnish the first working set, inspector's set and the master set necessary for guns in quantity, and when 1000 complete rifles per day are figured on it would mean that the working sets must be increased from 1 to 10 and the inspector sets from 1 to 5, keeping the master set simply for reference. It has been conclusively shown that out of a total of practically 2500 to 3000 first class gage makers in the country, the supply was wholly inadequate to tackle several different propositions at the same time.

In regard to tool making: It would take at least 1000 tool makers one year to furnish jigs, fixtures and small tools for the output of 1000 rifles per day. Therefore, in case of anything happening that would make necessary an order from this government for practically 5,000,000 rifles, we would have a proposition which would tax our tool plants to the utmost.

GAGES FOR SHELLS

Large as the above figures are, they represent only a small part of the problem of gages, etc. Besides rifles, there would be required aeroplanes, range finders, large guns and carriages, shells and many other items, for all of which the necessary equipment of gages, jigs, etc., would have to be provided. Frank O. Wells, president Wells Brothers Company, Greenfield, Mass., and Charles E. Stuart gave some figures as to the work necessary to prepare for the manufacture of shells on a war basis. They estimated conservatively that at least fifty engineers and draftsmen would be needed for fifty weeks to prepare the drawings for the seventeen sizes of shells now used by the army, together with the drawings for the gages, jigs, tools and fixtures. Based on a total daily production of 200,000 rounds of ammunition of this character, it would be necessary to equip

100 factories, each employing 2000 men. To make the gages, tools and fixtures for these factories would require the employment of 800 well-trained men in well-organized factories for a period of five years, working 300 days in the year.

THE SOLUTION OF THE PROBLEM

Having stated the problem to be solved, the engineers were equally ready to offer the solution. As the government fixes the standard of quality to be attained in the manufacture of munitions, it was the almost unanimous opinion that the government should furnish the means of reaching this standard. Messrs. Wells and Stuart presented the following points for consideration:

1. The government should be called on for all the drawings, books of instructions, gages, jigs and fixtures—in fact all the special equipment necessary to produce munitions of war.
2. Drawings and books of instruction worked out to the minutest detail should be in the vaults in all the arsenals and navy yards, ready to be distributed to the various plants at short notice.
3. Gages, jigs and special fixtures should be also in vaults in the arsenals to be given out at the same time that the drawings and books of instructions are.
4. The operations and methods of handling the work necessary to make munitions of war should be carefully standardized in order that no matter in what section of the country it is made, the cost will be the same, because the standardization of time means also standardization of price.
5. The present arsenals should be used more as experimental stations from which the private plants will get their instructions and information regarding the best methods of producing the goods they are called upon to manufacture.

The above ideas were enlarged on by John H. Barr, consulting engineer Remington Typewriter Company, New York, who mildly criticised the proposition in Mr. Miller's original paper that each shop making munitions be required to maintain a set of corrected drawings and to construct one set of gages and tools for such product as it is expected to supply. Mr. Barr maintained that

The desired result may be more certainly attained by construction of such gages and tools in specially equipped government tool factories, controlled by a highly expert staff and manned by workmen of corresponding skill. These government tool factories can construct *all* gages required and most of the important special tools. Drill jigs made in these factories can be used in any shop having suitable drill presses. Some variations exist among the machines of the numerous civil shops in the requirements as to drop forging dies, punch press dies and milling fixtures, but this will not seriously hamper the wholesale manufacture of such tools by the government tool factories, which would be on such a scale as to permit real *manufacturing methods* in constructing standard tools.

One other advantage of this plan is that it will tend to a uniform and high standard of product. The prosecution of high-class tool manufacture will involve considerable production in the government shops in thoroughly testing the equipment, and will develop a large corps of mechanics, skilled in the making of these tools, and familiar with their use and the requirements to be met by their output. This

There should be a card index of every engineer in the United States available for service in the army, navy or any department that in case of need can supply munitions of any sort. Should we be threatened with war, the first thing needed will be men of experience and intelligence, capable of supplying the army and navy with subsistence, transportation, inspection, administration of shops; men skilled in purchasing, contracting, industrial organization.—Dr. William Kent.

corps of specialists would be a source from which to draw inspectors and instructors for duty in the private shops. Even one such man in a large private shop could render inestimable service in putting the plant upon an effective military basis.

Harold V. Coes, vice-president Sentinel Mfg. Company, New Haven, took an almost identical position, while H. V. Haight, chief engineer Canadian Ingersoll-Rand Company, Ltd., Sherbrooke, Que., thought that the private shops should be encouraged to make their own equipment, even to machine tools. In this way, he said, equipment could be rapidly increased in time of war. Inspection gages should be furnished by the government, but jigs, attachments, cutting tools, etc., would necessarily be special and adapted to the needs of each shop. It would be impossible to get these from the tool shops or government arsenals. Shops not equipped to make working gages had better become equipped or stay out of munition work.

Material and Specifications

Under the stress of war conditions the supply of raw material to the munition plants would assume a position of supreme importance. The vast quantities of iron, steel and other materials necessary would have to be distributed in accordance with the needs of the different factories, and the production and distribution would have to be co-ordinated to ensure that no branch of the service was hampered for lack of material. The following interesting plan was offered by Mr. Haight:

The government should be the general contractor and let only sub-contracts. If shrapnel shells are to be purchased, the government should order the steel, have it shipped to the forge shops for forging and to the machine shops for machining and assembling. Bullets should be ordered from the lead works, copper bands from the brass works, etc. In this way each man will undertake the work he best understands and the small shop will not be afraid of the work because it will be simple both financially and mechanically.

RAW MATERIAL SPECIFICATIONS

The specifications for raw material would play an important part in the speed with which munitions could be produced. Writing on this subject Mr. Juthe said:

In some cases the specifications are more severe than any ballistic test has shown necessary as a factor of safety. If the committee already appointed from the different engineering societies can get together and formulate a standard specification that will cover the different parts for ammunition and small arms, the most serious setback that has been found under the present conditions can be overcome, and a great step in the preparedness program will be made. Specifications should cover the following points in the making of a standard high explosive rifle:

1. The analysis of steel necessary.
2. The method of manufacture of such steel with a minimum of waste.
3. The forging of the breech end of rifles without harmful effects to the steel.
4. The heat treatment of rifle barrels to give the highest physical properties wanted with a high degree of machining qualities.

ECONOMY OF MATERIAL

War, of necessity, causes prodigious loss and waste of material. It also causes, according to Percy E. Barbour, much unnecessary loss due to the specification of material of a grade higher than is necessary for many parts of the war supplies. For instance, at the beginning of the war, the nose openings in the shells for the English government, in which the detonating fuse is screwed, were closed temporarily by plugs of the highest grade of brass. These were replaced on the battlefield by the fuses, and the plugs were thrown away. The plugs are now made of wood, at 1/400 of the cost of the brass plug. Similarly, Russian specifications called for the use of enormous quantities of tin foil for certain supplies. The amount required for a single order was more than there was in the country, and lead foil was finally substituted with equally satisfactory results, and at a great saving in cost. Another instance was the requirement that the earlier Russian shells be nickel-plated to reduce the wind friction when fired.

Organization of the Men

Nearly one-half of those taking part in the discussion laid stress on the necessity not only of mobilizing the physical resources of the country, but of mobilizing the skilled workmen to operate these resources, and of the engineers to direct such operation. The foregoing excerpts from the discussion on the supply of jigs and gages give an idea of the great number of men that would be needed to supply the equipment that is absolutely essential before the manufacture of war munitions proper can even be begun. It is apparent that in order to supply this need the government should be able to find these men without the slightest delay. This requires organization of the highest character. It requires that we obtain definite knowledge of who the men are that can do the things that are necessary to equip the army and navy, the things that each man can do best, and where every man is to be found at any time. A suggestion as to the means of obtaining this information was offered by Dr. William Kent, who said that in addition to the form prepared by Mr. Miller for the proposed industrial inventory

another form should be prepared to get information for a card index of every engineer in the United States who is available for service in the army, navy or any department that in case of need can supply munitions of any sort. Should we be threatened with war, the first thing needed will be men of experience and intelligence, who are capable of supplying the army and navy with subsistence, transportation, inspection, administration of shops, men skilled in purchasing, contracting, industrial organization and the like.

Should we actually be engaged in war it might be necessary for the government to take over any industrial establishment, any railroad, any ship, any automobile, any source of supply of natural products, such as coal mines, or oil wells, and to commandeer the services of any men it might require for the operation of its establishments. For this purpose a competent board for the selection of the right man for each place is of the utmost importance, and this board should be supplied with a classified index of the available men.

The form of the indexing of engineers should include: Name, age, nationality, health, record of education, and experience, position now held, references as to character and ability, reasons, if any, why he should remain in his present position.

The same idea was expressed by E. H. Peabody, Marine Department, Babcock & Wilcox Company, New York, who wrote as follows:

There must be a census of men, and every man of us must be listed in it. The government must find out in what way the experience and talents of every one of us may best be employed in time of conflict. Every man of us must be assigned to his job, and be getting ready for the call—whether it be to active service with the colors or in those equally important fields of supply without which the army and navy become impotent.

Bernard M. Fine, chief tool designer, American Steam Gage & Valve Mfg. Company, Boston, and George R. Henderson, consulting engineer, Philadelphia, wrote in similar vein. Mr. Henderson pointed out that we would be wasting our resources if we permitted men with great technical skill and knowledge to serve in the trenches or at sea, where their training would not be of so great service to the country as it would be in the supply department. Mr. Fine observed that the officering of the munitions plants was the province of the mechanical engineer, and that the American Society of Mechanical Engineers could do no greater service than to organize its members for this work.

MOBILIZING THE SKILLED WORKERS

Definite proposals for mobilizing the skilled workers were presented by James A. Campbell, mechanical superintendent, Renfrew Mfg. Company, Adams, Mass., and Harry E. Harris, H. E. Harris Engineering Company, Bridgeport, Conn. Mr. Campbell proposed that the heads of factories should obtain from their men statements of their willingness to take their place in the munition factories in time of war. The men should be classified by their superintendents so that they could be assigned by a central committee to whatever work at which they would be most valuable. Mr.

Harris related how the very step proposed by Mr. Campbell had already been taken in his plant. He wrote, in part as follows:

It is not only necessary to enlist the engineers and the manufacturers, but also to get the support of every skilled workman. Let these men know more about the industrial preparedness program, enlist their sympathies and obtain their pledge of willingness to be depended upon in emergency. Make them feel that in case America is called upon to defend herself that their interests and their employer's interests are one, and that employers and the men will stand shoulder to shoulder in such an emergency.

As an example of what may be done along this direction, the company with which the writer is connected invited the men to meet and hear abstracts from the paper by Mr. Miller, and to take part in a general discussion. Men who for various reasons had neglected to take out their naturalization papers were earnestly advised to do all they could to get on record as to their intentions. Men who had their first naturalization papers, but had not taken out their second, were also given similar advice, and every man invited to join in forming an association and pledge himself to put all other considerations aside in case of a call for the defence of the country, and to pledge himself to serve in its defence as a member of the industrial reserve.

Transportation

Second only in importance to the production of munitions in time of war, is the transportation service to get them to the armies in the field. John Younger, chief engineer truck department, Pierce-Arrow Motor Car Company, Buffalo, pointed out that France alone was using in military service not less than 50,000 motor trucks. The war has shown the necessity of good roads to supplement the railways, which are built to serve the peace needs of the people and which have broken down under the strain of war traffic. In war every shipment begins and ends on the road, either in a horse or mule-drawn wagon or a motor truck. They are conveyed to the railway in the truck and distributed from it to the field by the truck. The roads must be equal to the demands put upon them. The entire transportation service is an engineering proposition.

Government Ownership

The advocacy of government ownership of munitions plants received the attention of several speakers. William B. Jackson, Chicago, said that those who felt that the government should put itself in position to produce all the munitions it would need in case of attack, either had not given any consideration to the subject or were misinformed as to the needs of the government in a war with a first-class power. The sooner that the idea of the government producing all the munitions is rooted out of the heads of the people, the better off the country will be. At best, the government can only own and operate what might be considered sample shops for the production of materials and supplies. In case of war the most intense activity of any reasonable development that the government might have in the line of manufacture of munitions, together with the most intense activity of every private plant that could be pressed into service would be necessary. The nation that is able to start the fight with the ability to provide at once the supplies necessary to keep the military organization going has a tremendous advantage.

The Value of Wealth

"Why has Germany shown greater industrial and military efficiency than the Allies?" asked Henry L. Gantt, consulting industrial engineer, New York. "The nation that is efficient in a military sense must first be efficient industrially, for the principles underlying the two are the same." Continuing, Mr. Gantt said that the financiers of England, feeling that wealth could purchase whatever was needed for them and their national life, have devoted their energies to the securing of wealth produced by others rather than to producing it themselves. Germany, on the other hand, developed its own resources and its own people. When the test came the German people were found to be a people who knew what to do and how to do it, while the industries of England were controlled as a rule by

people who understood only the commercial side. We, in America, also have been prone to regard financial strength as the most important strength, forgetting the saying of the ancient philosopher: "What availeth all thy wealth? He that hath better iron than thou will come and take away all thy gold." Iron to-day, the same as two thousand years ago, means tools of industry as well as weapons, and he that has the better tools is more powerful than he that has wealth. Therefore, says Mr. Gantt:

The move to get the engineers of the country working together for preparation is a most hopeful sign, for in the strenuous times in which we are living wealth may be of a little more value to us than it would have been to Great Britain but for the twenty miles of water which separated her from the continent of Europe. On the other hand, the power to do things cannot be taken away from us. The greater the power, the more important will its possessor become, as we realize the real meaning of the titanic contest which is now going on in the world.

The man who knows what to do and how to do it is pre-eminently the engineer. The new world, therefore, which is being ushered in by the great struggle now taking place, is one in which the engineer is destined to be the supreme power, for it is becoming increasingly clear that in future the man who owns things will not be as important a factor in the world as the man who can do things.

MUNITIONS ORDERS EVERY YEAR

Naval Consulting Board's Method of Holding Private Plants in Line

WASHINGTON, D. C., April 25, 1916.—The Secretary of the Navy has received from the Naval Consulting Board, recently appointed to inventory the capacity of the manufacturers of the United States to produce war material, a progress report outlining the board's policy with respect to the encouragement of private establishments to co-operate with the Government. After describing the work already done to enlist the services of many thousands of engineers in all parts of the country the report says:

"The second vital step in any and all plans for the military preparedness of this country lies in the practical application of the data compiled through the industrial inventory. No manufacturing or producing concern can in time of national emergency begin, without months of fatal delay, to turn out any product foreign to its usual line unless that concern, during the normal times of peace, has manufactured at least some small amount of such emergency product. The actual experience of hundreds of American manufacturers in connection with foreign munitions orders may be cited. The best manufacturing concerns in the United States have been and are months behind the promised times of delivery, even after nearly two years of the war, under the most favorable material and labor conditions, in a peaceful country undisturbed as to transportation and commerce and with every advantage of manufacturing equipment. No inventory of our country's resources can be made of practical service except through the most carefully prepared educational work in time of peace. The Army and Navy departments must be permitted through legislative means to place small annual minimum orders (educational orders) for the development of new sources of supply throughout every industry and throughout the entire country. The total volume of such orders will not be large. The payments should be made upon a cost plus a small profit basis and the munitions or goods resulting from such orders should go to swell the reserve supply necessary for the plans for national defense. Through no other system may we hope to accomplish a real industrial preparedness.

"Perhaps the most valuable single lesson for us in the European war lies in the labor situation within the various countries. The wars of the future will be won, not by the shedding of the blood of the laborer, but by

the sweat of the worker in the mills and factories behind the lines. We have learned that our skilled labor in all lines must be left at the lathe, the drill and the forge. We have learned that each unit of our producing equipment must be kept as fully manned as is any vessel of our navy. We have learned that for each million of men on the fighting line there must be a force of three millions of workers behind and that the position of these workers in the mills must carry with it all the honor accorded the soldiers in the trenches. We propose to organize this industrial reserve now in time of peace. For it is in normal time of peace that each and every plan must be perfected upon which we can expect with certainty to rely in time of war."

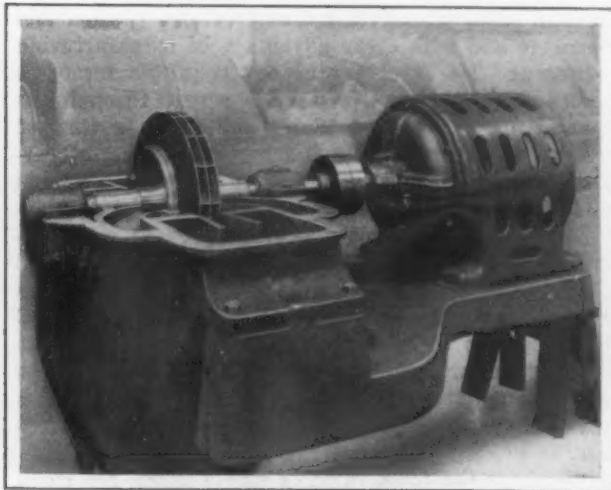
The board's report is understood to have received the approval of Secretary Daniels, a fact that may cause considerable surprise in view of his attitude toward the armor plate manufacturers, the private shipyards, powder makers, etc. Encouraging a large number of relatively small manufacturers to prepare to make war material, while seeking to put out of business three of the best equipped armor-making plants in the world, is likely to be regarded by disinterested persons as a distinctly penny-wise-pound-foolish policy.

W. L. C.

Low-Pressure Single-Stage Turbo Blower

A low-pressure machine has been added to the line of turbo compressors and blowers built by the Ingersoll-Rand Company, 11 Broadway, New York City. These machines, which are designed to handle volumes of from 3000 to 35,000 cu. ft. per minute at pressures ranging from 1 to 2½ lb. are of the single-stage, double-flow type. They are designed for supplying blast to foundry cupolas and heating and annealing furnaces, for atomizing oil for oil burners and for blowing air for water gas generators, and for pneumatic conveying and ventilating. Among the features emphasized are uniformity of the discharge, the absence of rubbing surfaces and the necessity for lubricating only the bearings. The absence of rubbing parts, it is added, eliminates the necessity for adjustment to take up wear and minimizes the maintenance cost.

The four-bearing construction, which is the standard in this line of machinery, is embodied in the blowers. The casing is split horizontally to facilitate installation and subsequent inspection and is doweled and bolted to a heavy sub-base upon which both the blower and the driving element are usually mounted. The impeller is the inclosed double-flow type. The wheel is machined from a solid steel forging, while the vanes and covers are made of pressed steel and are riveted in place, the rivet heads being driven flush. Labyrinth packing is relied upon to prevent leakage between the impeller and



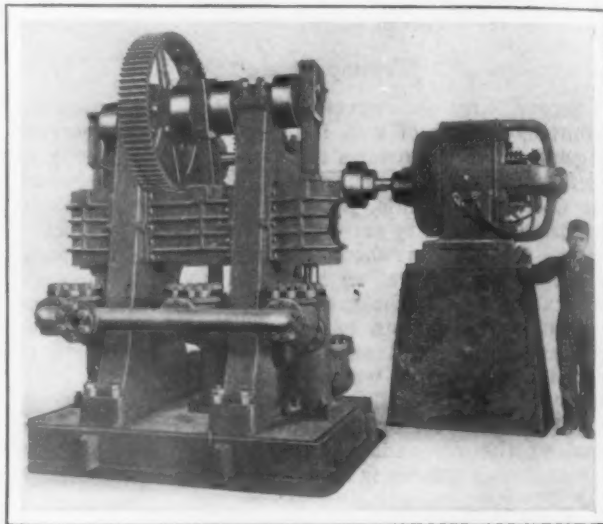
A Low-Pressure Single-Stage Turbo Blower Capable of Supplying from 3000 to 35,000 Cu. Ft. of Air per Minute at Pressures Ranging from 1 to 2½ Lb. The Upper Casing is Removed to Show the Double-Flow Inclosed Impeller

the casing. The bearings, which are the only parts requiring lubrication, are ring oiled and together with the housings are split horizontally. The machines are of the closed intake type with the intake opening at the bottom and the discharge at the top.

Electric motor, steam turbine or water wheel drive can be used, but the first is generally employed, as the high operating speed of the motor enables a direct connection to be made through a flexible coupling. Another advantage of this arrangement is that constant pressure is maintained, although the volume may vary from zero to the maximum capacity of the blower.

Motor-Driven Pot Valve Triplex Pump

For use in connection with hydraulic presses where the delivery of a large volume of water against a high pressure is required, the Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has developed a new hydraulic pump. This is a vertical triplex unit equipped with mo-



A Vertical Triplex Hydraulic Pump Equipped with Motor Drive and Pot Valves for Both the Suction and Delivery Chambers

tor drive and pot valves for both the suction and discharge chambers. The use of these valves was made necessary by the large volume of water which the pump is called upon to handle in a given time, the volume of water and the pressure against which it is delivered, depending, of course, upon the diameter of the plunger with which the pump is equipped.

The stroke of the plunger is the same in all cases, 12 in., and the normal rate of operation is 45 strokes per minute. The diameter of the plunger ranges from 4 to 5½ in., and the volume delivered varies from 88 gal. against a pressure of 1700 lb. per square inch, with the smallest plunger diameter, up to 183 gal. against a pressure of 800 lb. with the 5½-in. plunger, the capacity varying proportionately with the intervening sizes. It is emphasized that the total area of the valves used is no greater in proportion than the single-valve type of pump, but at the same time it is possible to carry lighter checks which have a greater freedom of movement than a single large one would have. Another advantage claimed for this arrangement is that the lift of the checks is also shortened with a corresponding reduction in the slippage that occurs when single suction and discharge valves are used on large-capacity pumps.

The power for driving the pump is supplied by 100-hp. electric motor having a direct connection through a double set of reduction gears. The ratio of the first set is 5 to 1 and that of the second 3 to 1. The height of the pump is 10 ft.

The Gehrich Indirect Heat Oven Company, 60-62 Franklin Avenue, Brooklyn, N. Y., has received a further contract from the National Cash Register Company, Dayton, Ohio, to duplicate its recent order for six indirect gas-heated radiator type ovens, making a total of 17 Gehrich ovens in operation at that plant.

GERMANY'S MANGANESE SUPPLY

Some of the Factors in the Widely Advertised "Metallurgical Secret"

BY A BELGIAN ENGINEER

THE IRON AGE has twice commented on the ferromanganese situation in Germany, in connection with Dr. E. Schroedter's boast that by their own "metallurgical secret" German steel masters had been able to make steel without importing manganese ores. By way of further lifting the veil of mystery from the question of manganese supply in Germany I submit the following:

Up to July, 1914, practically all the manganese ores required by the German iron industry were imported. Brazil, India and the Caucasus mines (Poti) supplied the bulk. The ore was high grade, the manganese percentage varying between 45 and 54. The trade was in the hands of half a dozen import houses—Dutch, Belgian or German—backed by German banks or iron masters. The arrival ports were Antwerp for the Belgian, Luxemburg and Lorraine districts and Rotterdam for Westphalia. The imported manganese ores were used for two distinct purposes:

1. To enter mixtures for making Thomas or open-hearth pig iron containing from 0.50 to 1.75 per cent of manganese.

2. To make ferromanganese with up to 80 per cent manganese, or spiegel with about 20 per cent manganese. This last manufacture was centralized in Westphalia by the big concerns like Krupp-Rheinhausen, Gelsenkirchen and Phoenix.

The very healthy financial condition of the big German steel companies and the foresight of their purchasing departments, as well as the nature of the trade—big ships arriving in the ports, return freight, etc.—favored great stocks of these ores in the yards of the blast furnace plants. Thus the war found most of the works with a handy reserve of supply on, which with the reduced production of steel lasted about 10 months.

STOCKS IN BELGIUM AND FRANCE TAKEN

The invasion of Belgium and northern France with their important iron industries and the capture of Antwerp gave to the Germans the ore stocks of that region. All the manganese ores were confiscated by the military authorities and carefully shipped to the Westphalia district under the expert supervision of a technical commission. It is futile to attempt figures, because no shipping data of Antwerp are available. I only recall that Belgium and northern France have capacity for the production of 6,000,000 tons of pig iron a year, mostly steel-making pig. Anybody will be able to draw conclusions about the importance of the manganese item.

In the spring of 1915 the Siegen and Nassau mines, which before the war were not worth working on

account of the low percentage of manganese (about 15 to 20), the high cost of mining and the competition of the imported ores, were pushed to the highest production possible to meet the demand of the market.

In the summer of 1915 prices went up, scarcity was felt and the winter campaign was in sight. Substitutes for manganese ore were looked for and found. The most important was the slag of the ferromanganese blast furnaces of Westphalia, worthless before the war, and accumulated as a nuisance in immense cinder dump hills. As every metallurgical engineer knows, the blast furnace process involves a large loss of manganese, the slag taking it up. This slag, with 8 to 14 per cent manganese, gives under the present conditions in Germany a pretty fair ore, its mining cost being low and the slag especially fit for flux additions for Thomas pig iron. The only disadvantage of its use, the high coke consumption per ton of iron blown, is not serious, as fuel is available in the empire. The enormous supply of this substitute will certainly help to lengthen the war.

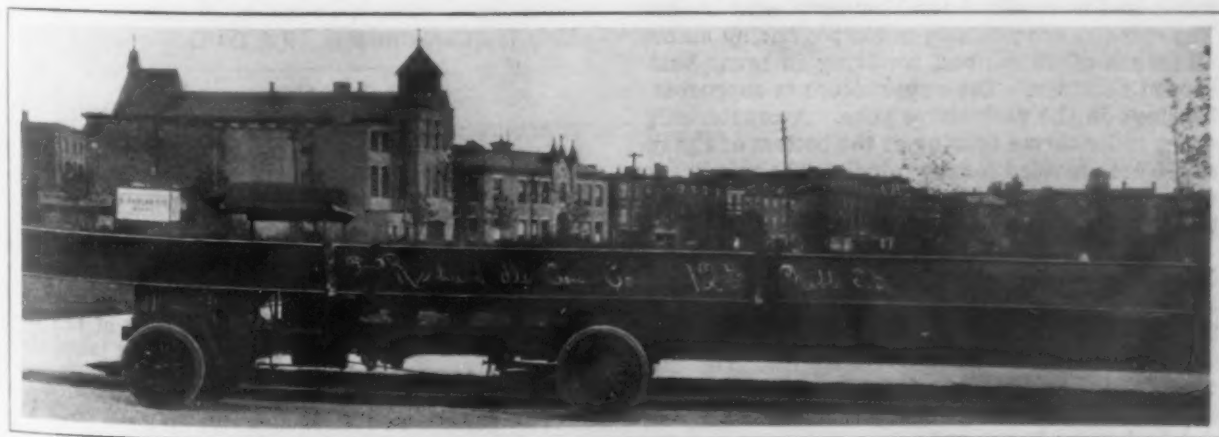
EFFICIENT PRACTICE

"The secret of the German metallurgist," which I think a recent German writer had in mind in referring to the way in which Germany has dealt with the manganese problem, is merely the spirit of saving that characterizes all the European metallurgists, especially the Germans. Savings and theoretical efficiency are the passwords of the iron industry there, and there is more freedom to the technical expert than the sharp business man of America allows his engineer. To illustrate by an example: Premelting of ferromanganese at basic-Bessemer plants gives just enough saving of metal to pay for the melting furnaces and to balance the fuel cost. The practice is common in Germany, but is considered here as an unprofitable complication.

Even considering the reduced war production of steel in Germany (to about two-thirds normal) everybody must admit that scarcity of raw materials exists and that the prices of ore have gone up, but manganese is still available. But I question if even the hampered manufacture in Germany under government control drives the price of ferromanganese to the high mark now paid in America under the pressure of speculation. Germany will not face a serious situation in manganese before the spring of 1917.

Handling Long Beams with Motor Truck

Two I-beams each approximately 43 ft. long were recently delivered by the 4-ton Packard chainless truck owned by Richard DeCou, Twelfth and Noble streets, Philadelphia, Pa. The beams weighed 65 lb. per foot, which gave a total of 5547 lb. for the pair. The interesting feature about the loading of the beams on the truck was that the wheelbase of the vehicle was less than half the length of the beams. It is stated that the load was placed to distribute the weight properly and enable the truck to make the delivery at top speed.



Two I-Beams Nearly 43 Ft. Long Being Transported on a Motor Truck Having a Wheelbase Less Than Half That Length

Locomotive Frame Drilling Machine

The Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa., has built a new drilling machine. It is intended for locomotive work, but particularly for the drilling of frames. The machine is of the two-spindle type with the feed change gears mounted in a box adjacent to the spindle, and the separate work tables are adjusted through coarse pitch screws.

The machine throughout is of heavy construction and the drilling mechanism is of the same general design as that employed in the builder's radial type machine. The cross rail is of heavy box type construction reinforced by ribbing. The spindles are 4 in. in diameter and have an automatic geared feed of 18 in. and a vertical adjustment of the same amount through direct-connected gearing for the

48 in. to a maximum of 15 ft. The handwheel shown at the bottom of the arm controls the hand horizontal adjustment to the saddles. A lateral hand adjustment to the spindle saddle on the arm is provided to give a distance between the saddle and the face of the cross rail ranging from 6 to 24 in. The arm has two square lock gibbed bearings cast solid on top of the cross rail which are removable for renewal, and provision is made to compensate for wear with brass taper shoes.

The driving mechanism embodies a departure in design, such as the carrying by the top spindle sleeve of the spur clutch gears driving it, as well as the clutch controlling their engagement. The spindles are driven by individual 10-hp. motors running at from 300 to 1200 r.p.m. The power is transmitted through a horizontal driving shaft, on which is mounted a double train of bevel gears controlled by clutches and a vertical shaft on which spur back gears are mounted. The last set of gears provides two speed changes, in addition to that provided by the range of the motor. The motor bracket is cast solid with the arm, thus giving a rigid construction.

Two adjustable work tables, 30 in. wide, 36 in. high and 90 in. long, of box type construction, are provided. These tables are adjusted by coarse pitch screws receiving power from a 5-hp. electric motor and worm wheels controlled by individual clutches. In this way simultaneous or independent power adjustment is provided. The work to be machined can be clamped on either the top or the front of the table, as T-slots are provided on both faces.

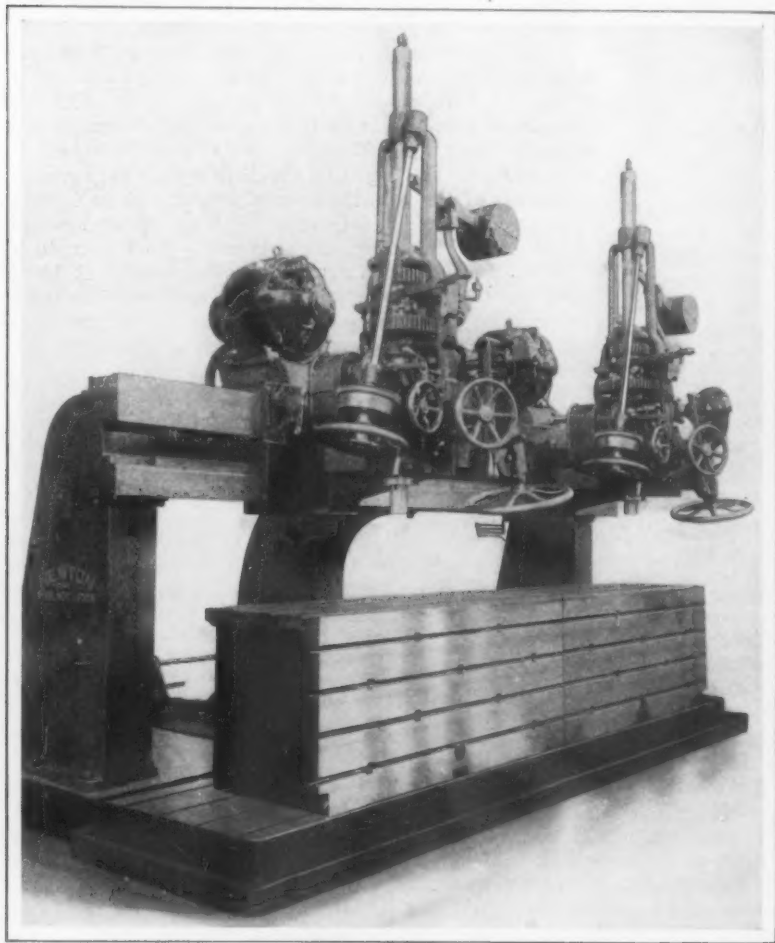
A floor plate is provided for the machine. The front of this, measuring 39 in. in width and 17½ ft. in length, forms a work table with T-slots. The table is entirely surrounded by an oil pan for catching the cutting lubricant, while the remainder supports the three uprights holding the cross rail. The center upright is of special construction to enable the work tables on which the work has already been clamped to be brought into alignment. The maximum distance from the floor plate to the bottom of the spindle is 81 in. and the minimum is 64 in. The corresponding distances between the end of the spindle and the

top of the adjustable work table are 48 and 43 in. respectively. The floor space occupied by the machine is approximately 19 x 20 ft.

A 23-Ton Conveyor Belt

A conveyor belt so large that it required shipment in four sections was recently supplied to the Zenith Furnace Company, Duluth, Minn. It was made by the Goodyear Tire & Rubber Company, Akron, Ohio, and is 54 in. wide and 1525 ft. long. The center of the belt contains eleven thicknesses of material and is covered on the pulley side by a 1/16-in. layer of canvas and a cover 7/32 in. thick on the conveying side. The net weight of the belt was 46,339 lb. and each of the four sections, in which the belt was shipped, was taller than a man of average height.

The Landis Tool Company, Waynesboro, Pa., has leased the plant of the Combination Heater Company, Hagerstown, Md., and will establish a branch there.



A Heavy Two-Spindle Machine for Drilling Locomotive Frames of All Sizes

rapid hand traverse and through a friction clutch worm and wormwheel for slow movement by hand. The spindles are mounted in sleeves having an overall length of 48 in., and revolving in brass bushed capped bearings. The upper sleeve is supported in bearings in the rack sleeve yoke. A counterweight and a roller thrust bearing at the bottom of the rack sleeve are provided for the spindle. The spindles conform to the No. 5 Morse standard taper, and retaining and drift key holes are provided.

Four feed changes, ranging from 0.0078 to 0.0185 in. per revolution of the spindle, are obtained through friction clutch gears, the different combinations being engaged by a spring key, which is controlled by the small hand levers shown. The range of spindle speeds is 28 to 456 r.p.m. Reversing fast traverse is provided through a double train of bevel clutched gears to the saddles on the cross rail from a minimum distance between the spindle centers of

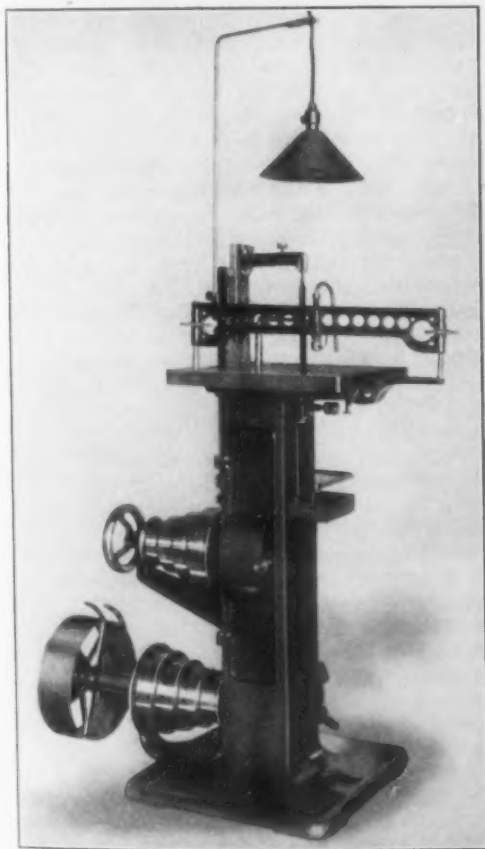
Die Filing Machine with New Clamp Arm

A new form of adjustable arm for clamping work in position and a support to hold in the proper position the light with which the machine is equipped are the special features characterizing an improved form of die filing machine that has been placed on the market by W. D. Rearwin, 341 Mill Avenue, N. W., Grand Rapids, Mich. The machine is designed, as the name indicates, for use of die and tool makers and it is pointed out that the use of the improved type of clamping arm has greatly increased the production.

The machine is equipped with a large square table that can be tilted to an angle of 7 deg. The table may be tilted so that the front edge is parallel with the floor, or so that the side of the table is parallel and the front edge makes an angle with the floor. Graduations are provided to control the movement of the table on either side of a horizontal plane. The clamping arm is relied upon to eliminate the oscillation of the work on the table as the file releases on the up stroke and also to eliminate the necessity of holding the work against the file by hand. The arm can be adjusted to accommodate various heights of work and can be used on either large or small work. The clamp can be released by a slight turn of a cam and if desired can be swung to the side of the machine when necessary to rearrange files or work.

An adjustable steel arm is used to hold the files which can be of any length or size from 4 to 12 in. of either straight or tapered types. A self-contained pump is provided to remove filings from the work, thus enabling lines to be followed easily without loss of time.

The machine is adjusted by a handwheel and a foot belt shifting arrangement is employed to start and stop it. The filings from the work are caught after



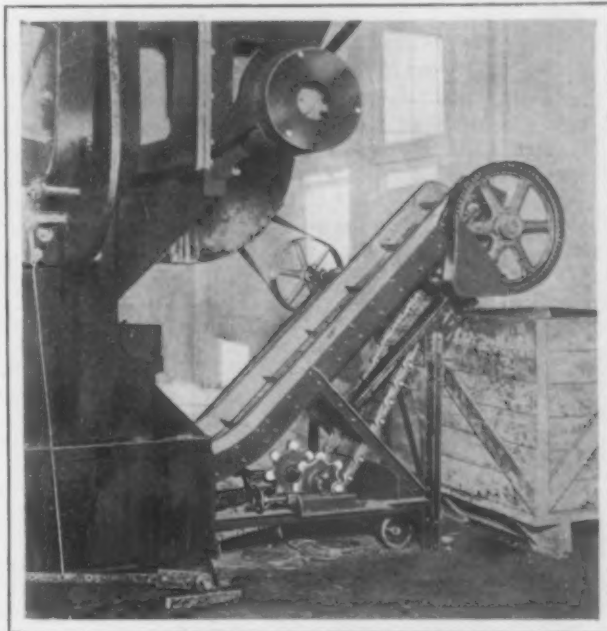
A Machine for Filing Dies Equipped with a New Form of Work Clamping Arm and an Adjustable Light Bracket

being removed by the pump in a removable receptacle. The machine is driven either from a countershaft or by a $\frac{1}{2}$ -hp. motor.

The New Process Steel Company, Lancaster, Pa., has announced an increase in wages of 10 per cent to all employees, effective May 1.

The Conveying of Products from a Press

A short inclined conveyor is used in the plant of the Prest-O-Lite Company, Indianapolis, Ind., to carry the pressed steel heads for gas tanks from the press on which they are made to the delivery



Conveyor for Transferring the Heads of Gas Cylinders from the Press Making Them to a Delivery Truck at an Hourly Rate of 1500 Pieces

truck on which they are taken to the place of the next step in manufacturing operations. The conveyor, which was built by the Chain Belt Company, Milwaukee, Wis., is made up of a series of flat plates. They form a continuous apron mounted on two strands of roller chain. A large, strong but light wearing surface is thus provided. Angle irons, spaced at intervals of approximately 16 in., are attached to the flat plates, and the projecting leg of the angle serves to keep the tank heads from slipping back in the movement up the incline. Steel plates about 6 in. high are riveted on the sides of the supporting framework to prevent the tank heads from rolling off at the sides.

The chain is fitted with rollers 2 in. in diameter and runs over 10-in. cast-iron sprocket wheels at the receiving and delivery ends of the conveyor. The tension of the chain is maintained by sprocket wheels engaging with the return strands and mounted on a shaft supported by bearings that are free to move in either direction in a guide frame. This frame is a stationary iron casting and the adjustment of the shaft is regulated by a steel screw projecting through one end of the frame.

The power for driving is supplied from the driving shaft of the press through pulleys and reduction gears, and the speed is synchronized with the capacity of the press. The rate of travel of the conveyor is between 50 and 60 ft. per minute, which delivers 1500 tank heads per hour. The conveyor may be lifted for placing at any part of the building where its services may be required.

The Magnolia Metal Company, 113 and 115 Bank Street, New York, is offering for sale a limited quantity of antimony which it is smelting at a new plant it has just completed at Matawan, N. J. The smelter was primarily built to supply the company's own needs. Its product has been thoroughly tested, runs 99 per cent pure or higher, and in every way conforms to accepted standards. The company is the only one on the Atlantic coast producing antimony.

Faults of the Small Electric-Arc Furnace*

Some of Those Pertaining to the Melting and Refining of Steel Especially for Castings—Wasted Electric Power of the Pacific Coast

—BY W. M. MCKNIGHT—

The small electric arc furnace is rapidly coming into favor for the production of small, highly-refined steel castings, and its advent is welcomed by both the manufacturers of steel castings and the electric power companies. Without going into the merits of the electric furnace as a competitor of the crucible and open-hearth furnace as to the quality of the product or regarding it as a welcome load builder for power companies, I wish to point out some of the handicaps to its universal adoption and successful operation.

The furnaces that are now in operation in several parts of this country, while differing in some respects in the mechanical construction and electrical demands, all refine the steel by the same chemical process—by raising the temperature of the bath to 2500 deg. C. or better, by boiling the metal to eliminate the impurities and by the introduction of the necessary refining agents to bring it up to the fineness desired.

CONSTRUCTION AND EFFICIENCY

All small arc furnaces are constructed on certain general mechanical lines, as follows: The furnace consists of a steel shell mounted on trunnions for tilting to discharge the molten metal. This jacket is lined with a highly refractory lining, sufficiently thick to retain the heat; the lining and shell, however, are pierced with port-holes for the purpose of charging the furnace with steel, adding the refining agents, discharging the refined metal and for inserting the electrodes, and all these port-holes furnish avenues of escape for the heated gases. The electrodes are secured in place by the holders mounted on the tilting shell, and the holder raises or lowers the electrode by hand operation, by hydraulic control or by electric motor control.

In spite of the fact that the electric furnace, to-day, is turning out small castings of a better quality and at a lower cost than by other processes, nevertheless, the over-all efficiency of the best furnaces on the market is far from 100 per cent. There are three principal sources of loss:

Electrical: In the improper delivery of the energy to the metal.

Mechanical: In the improper design of the furnace shell and ports, to exclude cold air and retain the heat.

Chemical: The improper combinations of refractory materials, that should be inexpensive in first cost, withstand the intense heat long enough to avoid delays through the interruption of the manufacturing process and not introduce any chemical combination with the metal. Also, there should be found an electrode that will not waste away too rapidly through oxidation, within and without the furnace, as it comes in contact with the air and gases.

Electrical conditions can be improved by supplying the proper current at the proper potential. Mechanical conditions can be improved by re-designing detail portions of the furnace. The chemical conditions can be improved only by exhaustive research and careful study.

Refractories are of two kinds: the heat-resisting linings and the heat-producing electrodes. The heat-resisting linings may be either acid or basic, depending on the degree of heat required for the quality of steel to be turned out. The heat-producing refractories may be either carbon or graphite.

TEMPERATURES AND LINING

Merely to melt down steel scrap and turn out castings of semi-steel and low-grade castings of unknown quality does not require a temperature of 2500 deg. C., and for a furnace for this class of work an acid lining of silica is successfully used. To refine the steel, how-

ever, it is necessary to use a basic lining of magnesite, at least where it comes in contact with the bath, or where the heat would be intense enough to melt down the silica and cause it to run down into the bath and combine with the metal bath or slag and the basic lining, thereby changing their character.

The furnace linings can be put in in two ways: build up with brick work, the bricks made to conform to the shape of the shell and laid up in a basic paste or coal tar binder, or the material for the lining may be made up into a mass and rammed into the shell. The brick lining offers some advantages, inasmuch as it has passed through a glazing process that should prolong its heat-resisting qualities, but it is expensive, particularly if special sizes and shapes are desired, and if the source of supply is remote, and the delivery uncertain.

The rammed lining should be superior from the fact that it is, if properly put in, a monolithic mass, hence there should be little danger of the bath breaking through to the shell, with the resulting damage to the furnace and loss of the batch.

THE ELECTRODES AND THEIR LOSS

Electrodes are of two kinds: carbon and graphite. Each has its merits. The carbon electrode is the less costly, but has less electrical carrying capacity than graphite, and consequently must be greater in cross-section to deliver the same amount of energy. It therefore has a larger amount of radiating surface, and consequently the saving in first cost of the carbon is offset by the loss in energy dissipated in heat. Owing to the intense heat of the electrode, its surface both within and without the furnace shell loses carbon by its surface contact with the air and resulting oxidation.

The graphite electrode, by virtue of its greater carrying capacity, is smaller in diameter, and offers less surface for radiation of heat and oxidation. The electrode within the furnace shell is subject to further attack by the passage of the electric current through the heated gases to the lining, which, at a temperature of 2500 deg. C., itself becomes a very good conductor of electricity.

CONCLUSIONS

Electric steel castings may not be better in quality than those turned out by skilled operators with fuel furnaces, but small electric steel castings can be made at a less cost under present conditions, which conditions could be improved, and then the furnaces will be limited only by the capacity of the source of the supply of electrical energy.

The field has apparently no limitations, if the chemist can overcome the losses I have pointed out. Formulate a better refractory lining, an electrode that will not waste away except in heating the bath, and utilize the waste gases by manufacturing them into a by-product or by-products.

I have only touched on one single product which gives promise of so much for the electric furnace. The field is undeveloped and has almost unlimited possibilities. In three Pacific Coast States alone, I am informed, there is approximately 1,000,000 horsepower in water-power going to waste, because a too zealous government is retarding its development, by capital ready and willing to invest, if more liberal terms of lease can be secured. Such terms might be forthcoming if the American Electrochemical Society would bend its energies to make efficient power consuming devices.

This certainly is the day for the chemist, and his greatest achievements will be in the electrochemical field.

*From a paper to be presented April 27, 1916, at the annual meeting of the American Electrochemical Society, at Washington, D. C. The author is with the Southern California Edison Company, Redondo Beach, Cal.

AGAINST THE TAVENNER BILL

Secretary of War Strongly Favors Scientific Management at Watertown

WASHINGTON, D. C., April 25, 1916.—The energetic work in opposition to pending legislation prohibiting the use of scientific shop management systems in Government service recently undertaken by the Committee of Ten of the engineering societies is bearing fruit. While the leaders of the House Committee on Labor still preserve their attitude of contemptuous indifference toward the interests represented at the recent hearing, the committee is no longer a unit for the bill, and it is expected a vigorous and aggressive minority would oppose the measure and insist upon further investigation. A comprehensive minority report will be made. The effect of such a report will not be limited to the House but will go a long way toward securing a more respectful hearing for the opponents of the bill before the Senate Committee on Education and Labor should the Tavenner bill pass the House.

A second development due to the activity of the Committee of Ten is the active opposition to the Tavenner bill of the new Secretary of War, Newton D. Baker, whose experience and observation of scientific management have been such as to entitle him to speak as an expert. Not content with giving nominal support to General Crozier, Chief of the Ordnance Bureau, in the latter's opposition to the Tavenner bill, Secretary Baker has forwarded to the Speaker of the House a carefully prepared letter couched in the plainest of language, the effect of which will be to place where it belongs the responsibility for legislation the enactment of which cannot fail to work great harm to the Government and to impose hardships on its employees.

Secretary Baker's letter describes the time study and premium system in use at the Watertown Arsenal and quotes some recent figures showing the premiums paid and the extent to which the employees have participated in these extra rewards. During the five years that the system has been in operation neither the day wage nor the number of employees has diminished; on the other hand, the amount of work done and the average earnings have increased in an important degree. The letter continues:

"The legislation which is being urged upon Congress is advocated by organized labor, which is opposed to the system intended to be prohibited for the essential reason which is embodied in the charge that it is a speeding-up system. I cannot understand this charge as having any other meaning than that the work required of the employees by the system is unduly severe. Of the truth of this charge in the practice of the system at the Watertown Arsenal there is no evidence whatever, but there is a good deal of evidence the other way. There is no complaint of overwork at the arsenal, and no workman has been discharged because of failure to meet the requirements of the system. To prohibit the system of which the records show undoubted advantages both to the Government and to the employees, because of a charge unsupported by evidence, or even by any attempt at evidence—for there has been no effort to prove overwork at the Watertown Arsenal—seems to me to be most unwise."

"There have been," Secretary Baker says, "expressions from the employees at the Watertown Arsenal both for and against the system. There are evidences that at least some of the expressions against it have come from representatives of organized labor, but I am persuaded that this opposition proceeds from a mistaken theory, for while it is obviously true that a piece-work system in which the pay of the employees is based solely on a piece price, and high-speed machinery is used to drive operatives harder than is consistent with their physical and nervous welfare, is objectionable, it is equally true in my judgment that the system above described as operative in the Watertown Arsenal is not open to either of these objections. The Government surely should not be denied the opportunity of securing efficient work from its employees without an investiga-

tion of the facts which would justify the action proposed to be taken.

"The wages paid to our operatives as a flat rate, irrespective of their response to the time system, is the current rate of the community for similar work; and in addition to that, premiums are offered, not large, but large enough to stimulate continuous and faithful activity. So far as I know, there is not a case on record at Watertown since the introduction of this system, of a nervous breakdown or physical exhaustion due to excessive work; nor is it claimed that the operatives in that plant, protected as they are against long hours by a wise eight-hour provision, are in any sense driven or hurried beyond a fair and safe limit.

"As I am not in any sense personally responsible for the work which has been done at the Watertown Arsenal, I can be permitted to say that in my judgment it represents an achievement of which both the legislative and executive branches of the Government can be justly proud."

W. L. C.

Self-Propelled Barges on the Mississippi

Water transportation on the Mississippi River, under new conditions, was begun April 15 with the inauguration of a line of self-propelled barges, constructed of steel, and each capable of carrying 2000 to 5000 tons. The barges, which are planned to demonstrate the availability of present water facilities, are equipped with mechanical loading and unloading devices, wireless apparatus to control their movements, etc. The first barge to leave on a southbound trip from St. Louis, Mo., carried nearly 2000 tons of freight of all classes. It is propelled by four internal combustion engines, and all cooking, lighting and heating are by electricity. The hull is divided into five water-tight compartments. The electric traveling crane has an outboard extension of 70 ft. on either side of the craft. A refrigerating plant is included in the equipment capable of maintaining a temperature of 32 deg. for 6000 cu. ft. of cargo. Four deckhands instead of the usual swarm of roustabouts will handle the cargo. The first barge is named the Inco I and is operated by the Inland Navigation Company, which will place a total of 36 such barges of varying capacity in service.

The N. O. Nelson Mfg. Company, St. Louis, with plants at LeClaire, Ill., and in Alabama, Indiana and elsewhere, recently distributed \$50,000 of stock among its employees and customers, making its total profit-sharing distribution of stock in the past seven years \$350,000. Under the plan employees and customers will ultimately own about 50 per cent of the total capital of the company, which manufactures plumbing supplies. The division of stock affects chiefly the Illinois and Alabama employees. The company is capitalized at \$1,500,000, of which \$1,250,000 has been issued.

The Pennsylvania Industrial Board has set Tuesday morning, May 2, as the date for a public hearing in the hall of the House of Representatives, Harrisburg, on questions relating to the operation of the new boiler code, recently adopted, and which will be effective July 1. Many inquiries have been received by the board from casualty insurance companies and manufacturers of boilers of various types as to certain regulations of the code. It is expected that representatives of many boiler manufacturers will attend the hearings.

The Ulen Contracting Company, Chicago, Ill., has placed with the American Cast Iron Pipe Company an order for 2500 tons of 4 to 30 in. pipe, and a similar order with the United States Cast Iron Pipe & Foundry Company. The pipe is to be delivered in Uruguay for use in the fulfillment of the \$5,000,000 contract which the American International Corporation has entered for the construction of waterworks systems in three Uruguayan cities. The total quantity of pipe required is understood to be between 10,000 and 15,000 tons.

ESTABLISHED 1855

THE IRON AGE

EDITORS:

GEO. W. COPE

A. I. FINDLEY

W. W. MACON

CHARLES S. BAUR, *Advertising Manager*

Published Every Thursday by the DAVID WILLIAMS CO., 239 West Thirty-ninth Street, New York

W. H. Taylor, *Pres. and Treas.*

Charles G. Phillips, *Vice-Pres.*

Fritz J. Frank, *Secretary*

M. C. Robbins, *Gen. Mgr.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: Equitable Building. Philadelphia: Real Estate Trust Building. Cleveland: New England Building. Cincinnati: Mercantile Library Building.

Subscription Price: United States and Mexico, \$5.00 per year; single copy, 20 cents; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year. Entered at the New York Post Office as Second-class Mail Matter.

Preparedness in Hobbles

The mechanical engineers have done the country a service of the highest value in putting before it plainly the magnitude of the problem to be dealt with in the event of war with a first or second class power. To the average man preparedness stands for an army of a million men and a great fleet of battle-ships. To the engineer it means the thousands of machines, hundreds of thousands of tons of raw material and millions of workmen that would be required to arm and equip the men and the ships. The vast amount of work that would have to be done before even a start could be made in furnishing the arms, ammunition, transportation and the rest, was set forth at the New Orleans meeting of the American Society of Mechanical Engineers in the discussion abstracted elsewhere in this issue.

The demands of a war would tax the engineering resources of the United States to the limit. It was shown at New Orleans that to furnish the gages, jigs and fixtures necessary for the manufacture of rifles alone, for an army of a million men, would require the sole services of a large tool works for five years. It would take 50 engineers a year to make the drawings for the shells, gages and fixtures for the artillery ammunition of the army. These are but two of the items whose manufacture we must be prepared to undertake. When we extend the list to include large and small guns, range finders, automobiles, telephones, wireless apparatus, clothing and the innumerable items required for modern warfare, it is evident that only the greatest possible efficiency of the workmen, the highest type of organization and whole-hearted service from every man would enable the country to meet the emergency.

In the face of these facts, how can Congress pay serious heed to those who for selfish reasons are working for the passage of the Tavenner bill to prohibit time studies in Government arsenals? The industries and workmen of the country, particularly those of the Government itself, were never in greater need of increased efficiency; yet there is a deliberate attempt to force a lowering of their efficiency. The attempt is the more reprehensible since the Government arsenals, in the event of war, must become the standards of practice for the private shops. There could be no surer way to handicap the army and navy, and even contribute to possible defeat, than to pass this bill to decrease the efficiency of munitions workers and curtail the output of the arsenals.

Pig Iron and Scrap Prices

It is considered remarkable by most observers that in this general movement in the iron and steel market the advance in pig iron has been so small compared with the advances in billets and in most finished steel products. Generally speaking it may be said that pig iron has advanced about \$6 a ton and steel about \$25, or fully four times as much. As a result of these divergent movements pig iron is about a dollar a ton higher than at the top points in 1912 and 1909, and an average of about \$6 a ton below its top point in 1907, whereas both billets and finished steel products have passed far beyond all the top points reached in the previous movements, except that in 1899 a few products sold at higher levels than obtain at present.

In 1907 the highest price reached on Bessemer billets was about \$30, while Bessemer and basic iron sold up to fully \$23 at Valley furnaces, showing a spread between pig iron and billets of about \$7 a ton. At the present time the spread is from three to four times that amount. It might be suggested that in 1906 and 1907 the policy of the large steel interests was to curb the price advancing tendency and prevent steel prices from reaching an unsafe level, while no such policy obtained with respect to pig iron. In the present movement there has been no restraint upon steel price advances, but it can hardly be said that there has been any artificial restraint in pig iron.

It is to be noted that although the demand for finished steel products is distributed in quite an unusual manner there have been developed no very important shortages of rolling or finishing capacity, the pinch being in the production of raw steel; and this circumstance, taken in conjunction with the fact that a large tonnage of special war steel is being produced, under specifications that require a large discard, suggests that the steel making units can be placed under great pressure without there being a corresponding shortage of raw material, pig iron and scrap.

The production statistics of the United States Steel Corporation, already published, show that the corporation's output of finished steel in 1915 was a materially smaller proportion of its ingot production than in preceding years, and the statistics of the country as a whole, which may not appear for several months yet, will doubtless show the same divergence. Any noticeable divergence is very

significant, seeing that it was not until the second half of 1915 that the production of "war steel" reached important proportions.

Not only is there heavy cropping of the ingot and billet in the production of shell steel; in the finishing of the rounds into shells there is a very heavy production of turnings. The loss in weight is greater than in the fabrication of almost any other description of steel. The outcome of scrap has accordingly been very large, furnishing not only heavy melting steel for the open-hearth furnaces but wrought turnings for the blast furnace. A part of the present excess in pig-iron production over the previously estimated capacity is due to the liberal use of turnings at many blast furnace plants.

The scrap markets have shown a declining tendency in recent weeks, but this trend is not particularly illuminating, seeing that the scrap market has fluctuations of its own. In a pig-iron and steel movement covering a period of a year, or two years, the scrap markets may have several ups and downs. When a top point is being reached in all iron and steel commodities it is scrap that reaches its top point first, but seeing that a decline may be followed by another advance, the fact that scrap prices have lately been declining is not a definite augury.

The failure of pig iron to score a sensational advance, when the steel made from it has given such a remarkable performance, is no proof that a sensational advance will not occur. With the large amount of new construction in steel making a pinch may still occur in pig iron. Yet the approach to the \$25 mark, which has figured in the predictions of the more optimistic pig-iron prophets for some months, is much more gradual than producers apparently expected.

Millions of Tons of War Steel

The extent of the absorption of steel for shells by the war, if the total could be expressed in tons, would stagger the average mind. While Great Britain and France on the one side and Germany and her allies on the other are converting many hundreds of thousands of tons of their own steel into various kinds of shells, the United States is contributing enormously to the total.

The exports of steel bars from this country have probably gone mostly to France, while those from Great Britain to France have exceeded all previous records. The extent of this movement, which began in January, 1915, for this country, is shown by the following table based on official data:

*Steel Bar Exports from the United States and Great Britain
Chiefly for War Purposes*

	From the U. S., Gross Tons	From Great Britain to France, Gross Tons
August to December, 1914.....		11,530
Year 1915	426,002	349,297
January and February, 1916...	112,295	96,755
Total	538,297	457,582

These shipments from the United States are at more than four times the rate before the war and those from Great Britain to France more than seven times. The exports of bars from the two countries, largely for war purposes, thus amount to nearly 1,000,000 tons.

There are also to be considered, in computing the tons of steel Europe is firing from guns in this war, the shipments from this country of shell forgings and of billets for such forgings. Our exports of semi-finished steel in the eight months ending with February were 560,000 tons. To these must be added the tens of thousands of tons of steel in the form of shells, loaded and unloaded, that have gone forward on American munitions contracts. Canada's contribution has probably been 400,000 to 500,000 tons a year. It would appear, therefore, that this war has already called upon the steel works of the world literally for millions of tons of steel to be exploded in the slaughter of armies, for the blasting away of fortifications and trenches and for the destruction of vessels of war.

The "Nick and Break" Test for Rails

The record of the results of inspecting 35,000 tons of rails rolled by the Algoma Steel Company for the Illinois Central Railroad under the specification which calls for the acceptance or rejection of rails on the basis of a "nick and break" test of the rails of each ingot of a heat has brought definite and valuable information to bear upon the problem of rail specifications. Moreover, the strong indorsement of this test given in the report of the inspection, as read before the American Railway Engineering Association by Capt. Robert W. Hunt and C. W. Gennet, Jr., and published in THE IRON AGE of March 23, adds weight to the facts. The attendant discussion at that time and since indicates, indeed, that greater importance has been attached to the Algoma experience than might be expected from observations based on but a small tonnage, all of which was rolled at the one mill.

Naturally those who have struggled with the rail problem for years and have watched the performance of millions of tons view with conservatism an innovation whose merits are proved by but a single demonstration. If the rail manufacturers of the country are not yet ready to agree that the testing of rails from every ingot accomplishes what is impossible with the testing of rails from the second, middle and last ingots only, their position need not be interpreted as an arbitrary opposition to the new specification. Yet a prominent engineering journal, in an editorial referring to the "nick and break" test, makes the following statement:

In order to make a trial of a simple and promising way of insuring the selection of good rails and the rejection of bad ones, it was necessary to go out of the country to a Canadian mill. American rail mills would not try the new method.

The statement is incorrect, and likewise the inference. American mills did submit bids for the order in question, revised specification and all. They lost the order solely on the basis of price. The vice-president of the purchasing railroad said at the time that the question of specifications had nothing to do with placing the order with a Canadian mill. The railroad maintained that it could not forego the large saving possible by reason of a difference of \$3 a ton in the price of domestic and Canadian rails. The domestic mills did expect that the extra cost of equipment necessary for the conduct of the test of rails from every ingot would be charged to the rails and paid by the railroad.

The showing made at Algoma would indicate that the rail mills need not have asked an "extra" because of this specification; that in fact a saving to the mill results from it. The report showed that the "nick and break" test on rails from each ingot resulted in a total saving of \$7,970 to the mill in the rolling of 30,000 tons, or at the rate of 26c. per ton, in consequence of 797 tons of rails going into service which would have been rejected under the specification calling for a test of only three ingots from a heat. The ten rollings from which the above rails were made required a total of 61 days, so that the saving appears to have been \$130 a day, less the wages of four extra men, or approximately \$10 a day. But granting that a similar saving would be possible in every mill and for any tonnage, it is still true that the waiving of the "extra" in this case would not have secured the order for domestic mills.

Of more importance, however, is the evidence as to the effectiveness of the inspection under the revised method. In the discussion brought out by the report A. S. Baldwin, chief engineer of the Illinois Central, made this statement:

In 1913 we secured from a mill, which I will designate as No. 1, 5000 A rails. At the end of ten months there had been 14 failures in those A rails, or at the rate of 28 per 10,000 A rails. From the same mill in 1914 we purchased 10,000 A rails. At the end of ten months there had been five failures in those rails, or at the rate of 5 per 10,000. From another mill, which I will designate as No. 2, in 1913 we purchased 4900 A rails. At the end of ten months there had been 37 head failures among those rails, or at the rate of 58.8 per 10,000. From No. 2 mill in 1914 we purchased 8000 A rails. At the end of ten months there had been 12 failures, or at the rate of 15 per 10,000. To-day at the close of ten months, from the 14,500 A rails purchased from Algoma (inspected under the "nick and break" test) we have not had a single failure.

The Chicago, Rock Island & Pacific and Canadian Pacific railroads added testimony of a similar nature.

It will be noted from the figures presented by Mr. Baldwin that mill No. 1, which had 28 failures in ten months from 10,000 A rails of 1913 rollings, had only five failures in ten months from 10,000 A rails from 1914 rollings. The second instance is a parallel. Mill No. 2 had 58.8 failures in ten months from 10,000 A rails from 1913 rollings and but 12 failures in ten months from 10,000 A rails from 1914 rollings. The question immediately suggests itself, If the rates of decrease in failures shown in the period from 1913 to 1914 were carried into 1915, would there not have been a complete absence of failures? In any case it would appear that other influences than the "nick and break" test are equally effective in securing large reductions in the number of rail failures. In this connection it may be pointed out that the large trunk line having the lowest percentage of rail failures among all the railroads does not require in its specifications the "nick and break" test on rails from each ingot.

The report of the inspection also leaves inconclusive the merit of this test as a positive means for the detection of defective rails. The statements and tables shown indicate that the "nick and break" test cannot be relied upon to determine segregation,

certainly not more effectively than other methods of inspection, and it is generally accepted that badly segregated material in rails is as liable to cause failure under traffic as piped material. On the other hand, it is not at all certain that rails, which under the "nick and break" test show piping in the web, will fail in the track, neither is it certain that rails which do not open up and show piping under the "nick and break" test will not split under traffic. Yearly records show that railroads that do not make the "nick and break" test on their rails have no more failures from split A rails than the railroads which use this test.

These are some of the reasons for the unwillingness of the mills to jump to the conclusion that in this revised specification there is a certain insurance against failures unobtainable under other forms of inspection. Further demonstration may completely establish the superiority of the test when applied to rails from each ingot. If so, certainly no rail mill has its face turned away from progress, and when that superiority has been fairly demonstrated the rail mills will presumably be found among the exponents of the best method of inspection.

Employers and Military Training Camps

Employers have a duty in connection with the military preparedness movement. Free military engineering lectures in different cities have been one demonstration of the interest of engineers in plans for national defense. Besides showing the service which may be performed on the field, in the defense fortification and at the factory, and outlining the places available for every physical condition and age, the lectures have unquestionably aimed to stir up interest in the military preparedness camps to be held under the guidance of officers of the United States Army next summer and fall. These camps in turn are training schools for officers.

The employers' part in these plans is this: They should encourage the right type of man in any desire he may express for the training camp experience. The woful lack of officers and of those qualified so to act is recognized. The new importance of the officer in modern warfare has been proved. One acquainted with some branch of engineering is, as war is now conducted, especially valuable. But natural leadership is a paramount requisite. Many who will join the training camps must be classed as little more than second rate commanders. It will thus be a highly patriotic service for the employer to provide a special opportunity for his leader-type men to join the training camps.

Open-Hearth Titanium Treated Rails

In an editorial in THE IRON AGE of April 13 on "Rails a Minor Product" reference was made to the production of 21,191 tons of titanium treated rails in 1915 as contrasted with 256,759 tons in 1910. In the same connection, by an error in transferring figures, it was said that other alloyed steel rails in 1915 "were confined to 24,970 tons reported as manganese rails."

The fact is that 24,970 tons was the total of all alloy-treated rails produced in 1915, made up of 21,191 tons of titanium treated rails and 3779 tons of manganese rails. The high record for titanium treated rails—256,759 tons in 1910—was due, as is well known, to the effort to stem the tide which in the past few years has brought almost the abandonment of Bessemer

steel for heavy rail service. With the passing of the heavy Bessemer rail the use of titanium to improve rail quality has been almost entirely in open-hearth practice, and there the proportion of titanium treated rails has not fluctuated greatly. In 1912, out of a total of 40,393 tons of alloy treated open-hearth and electric rails 37,832 tons was titanium treated. In 1913 the corresponding figures were 33,567 tons and 30,653 tons; in 1914 they were 27,447 tons and 22,831 tons (total rail production, 1,545,095 tons, against 3,502,780 in 1913) and in 1915, as indicated above, 24,970 tons and 21,191 tons.

An Iron Pipe Freight Decision

WASHINGTON, D. C., April 24, 1916.—The Interstate Commerce Commission has rendered a decision holding that provisions in tariffs for the non-acceptance for transportation of less than 10,000 lb. of iron pipe exceeding 10 ft. in length are unreasonable. The defendant carrier, the Ohio Electric Railway Company, for a number of years accepted iron pipe for transportation over its line without restriction as to size or quantity, but on Oct. 16, 1912, its tariffs were amended to provide a higher rate for the transportation of lengths exceeding 6 ft. On March 18, 1913, the following provision was made, which is still in effect: "Pipe, iron, less than carload, exceeding 10 ft. in length: In lots of less than 10,000 lb. not accepted; 10,000 lb. or more in one consignment, when loaded by shipper and unloaded by consignee, official classification basis."

In reporting upon the complaint of the Knapp Supply Company, Union City, Ind., against this provision the commission says: "Defendant is a common carrier engaged in interstate commerce and is bound under the express provisions of the act to accede to every proper application for service, subject only to such reasonable regulations as it may prescribe. It must accept less desirable traffic as well as that which is more desirable, and, although its best interest might be promoted by refusing to perform the service here in controversy, it has no right to refuse to transport iron pipe or any other article not dangerous to handle and which is ordinarily accepted for transportation." W. L. C.

Nagle Steel Company Buys Seyfert Mill

The Nagle Steel Company which was recently incorporated by L. F. Nagle, formerly sales manager and purchasing agent for Worth Brothers Company at Coatesville, Pa., has purchased the Seyfert plate mill at Seyfert, Bucks County, Pa., and will operate it in connection with the Glasgow Iron Works, near Pottstown, Pa., recently leased by the company. The mill was purchased from Samuel R. Seyfert & Brother, of Reading, Pa. It had not been in operation for the past two years. It is now being repaired and will be started up on double turn within two weeks. The plant at Glasgow has been running double turn since April 1. It is estimated that when both mills are running the company will be able to turn out 100 tons of plates a day. The Seyfert mill will roll plates up to 60 in. wide, and the two mills will give the company a full range of small sized plates from No. 12 gage up to 1½ in.

New Norwegian Blast Furnace

The establishment of a blast furnace and steel plant near Narvik, Norway, has been recommended by a committee appointed by the Polytechnic Association and the Association of Norwegian Civil Engineers. The proposal is that the furnaces use Kiruna ore first and later Norwegian ores. The estimated production is a minimum of 50,000 tons of iron and steel per year. The committee also advise that the coal necessary, about 125,000 tons per year, be imported from the United States.

The Racine Steel Casting Company, Racine, Wis., a subsidiary of the Belle City Malleable Iron Company, expects to place its three-ton Heroult electric furnace in operation May 1.

Republic Company's Annual Meeting

The annual meeting of the Republic Iron & Steel Company was held in Jersey City, N. J., April 19. John A. Topping, chairman of the company, presided. The stockholders unanimously approved of the action of the executive committee and the board during the past year. H. L. Rownd, Thomas J. Bray and G. Watson French were re-elected to the board of directors for a three-year term.

Addressing those present, Chairman Topping said: "Since we issued our annual report our expectations relative to the improvement in business have been more than realized. The newspapers have been filled with these accounts, so I don't believe that it is news to you. In the absence of a normal demand from the railroads and the building trades, we are producing more steel than ever in the history of the country—the industry, as a whole, I mean. A few years ago our company produced only 250,000 tons and now we are annually turning out 1,250,000 tons. Ten years ago we produced 600,000 tons of iron and practically no steel, while now we are producing no iron and all steel.

"The Republic Iron & Steel Company typifies the revolution that has taken place in the industry. We were essentially an iron company and now we are a steel company. Each year we have added to our output and reduced our cost. Steel is being produced now cheaper than ever before.

"When my administration came into office, we had a small output of coke. We bought large quantities of coke, iron ore and pig iron. To-day with all these, we are self contained. We mine more iron ore now than we can use. We have a larger tonnage in reserve for future wants and in this respect we are in a stronger position than our competitors. In making coke, we now produce, as by-products, tar, ammonia and other salable commodities. We have cut down our use of coal 20,000 tons a month."

Here a stockholder interjected with: "Have you considered the question of back dividends?" Mr. Topping said that they had not, that the board was bending every effort to fortify its position and have a fair cash account. He continued:

"Many anticipate a falling off in exports when the war ends. Those countries now in war will, as a result of impoverishment and inasmuch as they make steel, produce their own steel. There will be an outside demand, however, from Canada, South America, Africa and other countries that will need it, and we can expect a share in that business. Freight room is difficult to obtain and high. The movement for Europe, though, is cared for by the country for which the shipment is destined.

"There are at present 6000 stockholders in this company and during the past year 1000 names have been added to our holders' books, showing that there is a wider and broader distribution. There are very few foreign stockholders, although some shares are held in Holland. Mainly our stockholders are in the United States and are scattered all over it."

The New Ashland, Ky., Steel Plant

For the new steel plant of the Ashland Iron & Mining Company, Ashland, Ky., mentioned in THE IRON AGE, Feb. 3, 1916, the main building will be 120 x 378 ft., and there will be an office, toolhouse and warehouse. Three 75-ton open-hearth furnaces are to be installed, two soaking pits and a 36-in. blooming mill, motor driven. The S. R. Smythe Company, Pittsburgh, will superintend the construction. The blooming mill is to be furnished by the United Engineering & Foundry Company, Pittsburgh; the steel structures by the Mt. Vernon (Ohio) Bridge Company and the electrical machinery by the General Electric Company, Schenectady, N. Y.

The first of the six new open-hearth furnaces upon which work was started soon after the Worth Brothers plant at Coatesville, Pa., was taken over by the Midvale Steel & Ordnance Company will be in service within a few days. The other five furnaces are expected to be in operation by May 15.

NEW FOUNDRY MEETING PLAN

But One Session a Day—More Time for Exhibits and Visits to Plants

An innovation of special interest will be made at the annual meeting of the American Foundrymen's Association and the American Institute of Metals to be held at Cleveland in the week of Sept. 11. In order that those who attend may have more time for visiting plants, the program committee has decided to have but one technical session a day. This will continue from 9.30 a. m. until the papers and discussions for that session have been disposed of, the hour of adjournment having been tentatively fixed at 1 p. m. This arrangement will also enable the visiting foundrymen to devote more time to the inspection of the exhibits of foundry supplies and equipment and machine tools, which will be held at the Cleveland Coliseum. The conventions will continue for five days, or from Monday, Sept. 11, to Friday, Sept. 15, the opening being one day earlier than usual. The meetings of the American Foundrymen's Association and the American Institute of Metals will be held at the Hotel Statler, which also will be the headquarters of the two societies, but the headquarters of the exhibitors will be at the Hollenden Hotel.

On Monday morning at a joint session of both societies there will be the address of welcome and response, the annual addresses of the presidents and the reports of the secretaries. The representatives of the American Foundrymen's Association on the Joint Conference Board on the Training of Apprentices will present a report and the report of the Committee on Safety and Sanitation also will be heard.

A joint technical session will be held on Tuesday also, the program being limited to three symposiums: "Waste Foundry Sand, Its Reclamation and Disposal," will be discussed from different viewpoints. "Results of the Closer Co-operation of the Engineer with the Foundry," as relating to the manufacture of aluminum and brass castings, cast iron, malleable cast iron and cast steel will be considered next, and last, "Proper Gating of Molds" for the manufacture of aluminum and brass castings, cast iron, malleable iron and steel castings.

The annual business meeting of the American Foundrymen's Association will be held on Wednesday morning, Sept. 18, when officers will be elected and reports of the executive committee and the auditors will be heard. A report will be made by the special committee of five on the conferences that led up to the conduct of the exhibit under the auspices of the American Foundrymen's Association and the American Institute of Metals.

Three simultaneous sessions will be held on Thursday morning for the discussion of gray iron, cast steel and malleable castings, and on Friday morning malleable castings and steel sessions will conclude the business of the convention. The program promises to be the best in the history of the association, since the topics are practical and relate to problems daily confronting the foundryman.

C. E. Hoyt, Lewis Institute, Chicago, exhibition manager, has received a large number of applications for space and the indications are that the Cleveland Coliseum, which affords a floor area of 60,000 sq. ft. will be crowded to capacity. No assignments have yet been made, nor has a floor plan been prepared. This will be done within the next few weeks, when requirements of the various exhibitors will be known approximately.

A meeting of Cleveland foundrymen will be held shortly to appoint committees to entertain the visitors, to serve as guides in plant visitation and for the reception and entertainment of the ladies who attend. The annual banquet will probably be held at the Hotel Statler on Thursday evening, Sept. 14. Negotiations are being conducted to secure several speakers of national reputation for this occasion.

The Miami Products Company, Chicago, blew in its blast furnace at South Chicago on Saturday, April 22, and expects to make deliveries of spiegeleisen and ferromanganese up to 40 per cent in the second quarter.

Engineers in Get-Together Movement

The conference on engineering co-operation held in the rooms of the Western Society of Engineers in Chicago April 13 and 14 was attended by representatives of forty-two national, State and local engineering and technical societies from all parts of the United States. The purpose of the conference was to bring about a closer relation among engineers and engineering organizations, to discuss ways to improve standards of engineering practice and to gain a clearer recognition of the engineer as a civic asset. F. H. Newell, professor of civil engineering of the University of Illinois, is chairman and C. E. Drayer, secretary of the Cleveland Engineering Society, is secretary of the committee on engineering co-operation which had the meeting in charge.

The subjects discussed were practicability and limits of co-operation, employment, ethics and legislation. Co-operation from the standpoint of the State society was presented by Paul Hansen, president of the Illinois Society of Engineers, and by Clyde T. Morris, president of the Ohio Engineering Society; from the standpoint of the national societies by P. Junkersfeld, of the American Institute of Electrical Engineers, Horace C. Gardner, of the American Society of Mechanical Engineers, DeWitt V. Moore, of the American Society of Engineering Contractors, J. F. Hale, of the American Society of Heating and Ventilating Engineers, C. H. McDowell, of the American Institute of Mining Engineers, and John Howe Peyton, of the Engineering Association of the South; from the standpoint of the local society by Ferd. G. Gasche, of the Engineers' Society of Western Pennsylvania, A. J. Himes, of the Cleveland Engineering Society, H. L. Keck, of the Dayton Engineers' Club, and Lewis R. Ferguson, of the Engineers' Club of Philadelphia. Short addresses were made by Isham Randolph, Onward Bates, John W. Alvord and E. T. Perkins.

Employment was the subject of a paper by Arthur Kneisel, secretary of the American Association of Engineers. A. W. Hoffmann, of the Associated Technical Men, Inc., gave a paper, heard with marked interest, descriptive of engineering societies and their activities in Germany.

Legislation, with particular reference to recent experiences in Illinois, was discussed in a paper by H. J. Burt, of the Structural Engineers' Society of Illinois.

The following resolution was unanimously adopted:

That there is hereby established a sub-committee with F. H. Newell as chairman and four other members to be selected by him, with instructions to prepare a plan for forwarding co-operation among engineering societies upon matters of general interest to the engineering profession, such plan to be presented for formal consideration at a third conference on engineering co-operation to be called by the sub-committee at such time and place as may seem to it desirable.

Purchase of the Canadian Car & Foundry Company, whose plant is situated at Fort William, Ont., and its transfer to Russia, is sought by the representatives of the Russian Government, and all that remains to be done is the completion of an agreement between the company and the City Council of Fort William, before the deal is put through. This scheme is part of a plan by which the Russian authorities aim to increase the rolling stock of their railroads, in order that supplies and troops may be transported with greater facility. The plant was completed in 1914, but it was found impossible to start operations on account of the war. It is equipped with all machinery necessary for the manufacture of freight and passenger cars.

The Chattanooga Steel Company, which is building a steel plant at Chattanooga, Tenn., to contain two 90-ton open-hearth furnaces, has decided to add two more at once of the same capacity. The company will also install a universal mill to roll sheared plates 62½ in. wide and universal plates 48 in. wide.

The Turner Heat Treating Company, 126 Ferry Street, Milwaukee, Wis., is installing a small furnace for the production of high-speed tool steel.

STEEL CORPORATION'S EARNINGS

March Quarter a New High Record—Increase of \$9,480,836 on December Quarter

The statement of the United States Steel Corporation's earnings for the quarter ended March 31, 1916, shows net earnings of \$60,713,624, being far above any previous quarter's figures. The December quarter made a record in that respect, but the March quarter exceeded it by \$9,480,836. The net earnings of the March quarter in 1915 were only \$12,457,809, being little more than one-fifth as large as those of the quarter ended March 31, 1916. Regular dividends only were declared. The statement compares as follows with the first quarter of 1915:

	1916	1915
January	\$18,794,912	\$1,687,150
February	19,196,396	5,638,578
March	22,722,316	7,132,081
Total earnings after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants, and interest on bonds of subsidiary companies	60,713,624	12,457,809
Less charges and appropriations for the following purposes:		
Sinking funds on bonds of subsidiary companies and depreciation and replacement funds	7,859,253	4,202,251
Sinking funds on U. S. Steel Corporation bonds	1,635,812	1,570,985
Net income	51,218,559	6,684,573
Deduct interest for the quarter on U. S. Steel Corporation bonds outstanding	5,444,687	5,524,379
Premium payable on bonds redeemable under sinking funds	261,000	245,136
Balance	45,512,872	915,058
Dividends for the quarter:		
Preferred, 1½ per cent.	6,304,919	6,304,919
Common, 1¼ per cent.	6,353,781	.....
Surplus for the quarter	\$32,854,172	*\$5,389,861

*Deficit.

The net earnings for the December quarter were \$51,232,788 and the surplus after the payment of regular quarterly dividends on both classes of stock was \$23,300,692.

A New Virginia Steel Company

The Virginia Steel Corporation, a new enterprise, has been organized and has applied for a charter with an authorized capital of \$3,000,000. The company has secured at Hopewell, Va., 150 acres of land, lying on the Appomattox River near the James River, on which it proposes to erect an open-hearth steel plant to contain four 90-ton furnaces, a 34-in. blooming mill operated by a 6000-hp. flywheel motor, three four-hole soaking pit furnaces and 24 gas producers. Later there will be erected a universal mill, capable of rolling sheared plates 62½ in. wide and universal plates 48 in. wide, also 18 and 10 in. mills for rolling steel rounds, hoops, bands, cotton ties and other light steel products. It is also intended to add later sheet and tin-plate mills. The W. R. Miller Company, House Building, Pittsburgh, is consulting engineer for the erection of the entire plant. The charter is expected to be granted within a week, and as soon as this is secured the Miller Company will start to place contracts for the equipment. The company intends to spend at once \$1,500,000 on the steel plant and accessories, and later about the same amount on the finishing mills. T. F. Heath, a banker of Petersburg, Va., is active in the new company. Others identified with it are Walter Sachs, C. W. Zimmer and J. L. Vaughan, all of Petersburg.

The Canada Cement Company, Montreal, is installing a number of electric furnaces in connection with its ammunition plant, and as a result the company will be a factor in the Canadian steel business when the demand for war munitions ceases. These furnaces will have a capacity that will equal the output of many regular steel companies, and will be operated whenever trade conditions are favorable.

CONTENTS

New Electrically Driven Tube Mill	991
Cost and Profit in Shells Approximated	994
Inverted Projectile Boring Machine	995
The Rise of the British Iron Industry	996
Two New Rifle Machines	998
Automatically Tapping Two Nuts at the Same Time	999
British High Speed Steel Scrap	999
Organizing for Industrial Preparedness	1000
Munitions Orders Every Year	1003
Low-Pressure Single-Stage Turbo Blower	1004
Motor-Driven Pot Valve Triplex Pump	1004
Germany's Manganese Supply	1005
Handling Long Beams with Motor Truck	1005
Locomotive Frame Drilling Machine	1006
A 23-Ton Conveyor Belt	1006
Die Filing Machine with New Clamp Arm	1007
The Conveying of Products from a Press	1007
Faults of the Small Electric-Arc Furnace	1008
Against the Tavenner Bill	1009
Self-Propelled Barges on the Mississippi	1009
Preparedness in Hobbles	1010
Pig Iron and Scrap Prices	1010
Millions of Tons of War Steel	1011
The "Nick and Break" Test for Rails	1011
Employers and Military Training Camps	1012
Open-Hearth Titanium Treated Rails	1012
An Iron Pipe Freight Decision	1013
Nagle Steel Company Buys Seyfert Mill	1013
New Norwegian Blast Furnace	1013
Republic Company's Annual Meeting	1013
The New Ashland, Ky., Steel Plant	1013
New Foundry Meeting Plan	1014
Engineers in Get-Together Movement	1014
Steel Corporation's Earnings	1015
A New Virginia Steel Company	1015
Association Safety Code for Foundries	1016
Pacific Coast Metal Trades	1017
Iron and Steel Markets	1018
Open-Hearth Valve Mechanism for Saving Gas	1029
Canadian Basic Steel for Shells	1029
Finished Iron and Steel Prices, Pittsburgh	1030
Metal Markets	1031
Military Engineering Lectures in Pittsburgh	1031
Iron and Industrial Stocks	1032
Reclaiming High Speed Steel	1032
Tantalum in Tool Steels	1032
Tungsten Supplies from Portugal	1032
Iron and Steel Institute's Annual Meeting	1033
An American Handbook for Russia	1033
Pittsburgh and Nearby Districts	1033
Iroquois Iron Company Gives Option	1034
Steam Pump Company Reorganized	1034
The New Timken Steel Plant	1034
General Chemical Buys Pulaski Foundry	1034
Thomas Auto Truck Company, Incorporated	1034
Personal	1035
Obituary	1035
Exports of Indian Manganese Ore	1035
Strikes and Wage Advances	1036
National Supply and Machinery Dealers' Convention	1037
Machinery Markets and News of the Works	1038

Association Safety Code for Foundries

Work of the Conference Board on Safety and Sanitation Promulgated by the N. F. A. for Adoption by the Various States

The National Founders' Association issued last week a set of regulations designed to establish safe and sanitary conditions in foundries. The organization has been doing progressive work in this direction for some time and the new safety code is put forth as a guide to its members and other foundry managers who would employ in their plants the safe methods and the protective devices that for both humanitarian and economic reasons are now considered essential in good foundry practice.

The new code is an effort to set forth rules that will conserve the health and safety of men and women who labor in foundries, without introducing regulations either so impracticable or so unnecessary, as shown by the records of thousands of foundry accidents, that they would only add a burden to the management without compensating gain to any of the interested parties.

The code was prepared by Magnus W. Alexander, whose work as executive secretary of the Conference Board on Safety and Sanitation has made him well known to all engaged in the metal-working industries. It has been approved by the officers, administrative council and the committee on safety and sanitation of the National Founders' Association and is considered by them to be an advance upon the codes now upon the statute books of a few States.

The causes which have led to the formulation of this code are not hard to find. At the present time in Massachusetts the State Board of Labor and Industries has under consideration a foundry code and has held three public hearings which have provoked much discussion. The attitude of Massachusetts foundry managers toward the proposed code and their action in offering substitute regulations was told in *THE IRON AGE* of March 16.

The real beginning of State regulation of working conditions in foundries is found in the New York code which went into effect in the early part of 1915. It is probably true that in New York the initiative was taken by organized labor, but when that code was under consideration many prominent foundrymen and the officers of the National Founders' Association took an active part in the hearings. With no common viewpoint, it was not to be expected that the representatives of the employers and of organized labor could agree. The code as issued was necessarily a compromise. It was taken by the labor representatives to Pennsylvania and later to Ohio and accepted with one or two minor modifications and with but little debate in both States.

In practice the New York code has not proved as good as it appears to be. As foundrymen in other States have learned of the impracticable and burdensome regulations which crept into that compromise, there has grown a demand for a code which would be workable and yet satisfactory and just to both employee and employer. It is to answer this demand that the National Founders' Association has had the new code prepared and it is hoped that efforts will be made by the foundry owners in all the States to have this code adopted as a State regulation, with as little modification as possible, to the end that uniform working conditions may prevail throughout the industry. Pending the consummation of these efforts, all foundry managers, members and non-members, will be urged to adopt the code issued by the organization and to adjust their shop conditions and practices to its regulations. The code in full follows:

I. Definition

Section 1. A "foundry" shall mean a place where iron, steel, copper, tin, zinc, lead, aluminum or compositions containing any of these metals are melted and poured into molds for the making of castings, and shall include all molding,

core-making, melting and cleaning rooms used in connection therewith.

II. Entrances

Section 2. Entrances commonly used by employees during working hours for direct passage between a foundry and the outer air shall, from November first of each year to April first of the next year, be so arranged as to prevent drafts harmful to employees working within the foundry.

Section 3. The provision of Section 2 shall not apply to entrances commonly used for horse-drawn vehicles, automobiles, mechanically operated cars or trucks or traveling cranes; but during working hours within the period specified, such entrances may remain open for only such time as is necessary for the entrance and exit of such apparatus.

III. Floors, Gangways and Aisles

Section 4. The floor beneath and immediately surrounding a foundry cupola shall slope and drain away from it.

Section 5. All pits or openings located in foundry floors shall be guarded by suitable covers or railings or by watchmen.

Section 6. The width of a gangway or aisle shall be understood to be the clear distance between molds, posts, partitions or other obstructions on one side of the gangway or aisle and similar objects on the opposite side.

Section 7. Every gangway or aisle in which molten metal is being handled shall, during the progress of casting, be kept in good condition, clear of obstructions and free from undue dampness.

Section 8. The floor immediately adjoining industrial tracks in gangways in which molten metal is being handled or over which workmen frequently pass shall be reasonably hard and flush with the top of the rails. Sufficient clearance for easy passage of ladle truck wheels shall be provided between the floor and rails.

Section 9. Where molten metal is carried in hand or bull ladles by not more than two men per ladle and poured into molds placed on both sides of the gangway, the gangway shall be not less than 4 ft. wide, except where molds alongside of the gangway are more than 20 in. high above the gangway level, in which case the gangway shall be not less than 5 ft. wide.

Section 10. Where molten metal is carried in hand or bull ladles by not more than two men per ladle and poured into molds placed on only one side of the gangway, the gangway shall be not less than 3 ft. wide, except where molds alongside the gangway are more than 20 in. high above the gangway level, in which case the gangway shall be not less than 4 ft. wide.

Section 11. Where molten metal is carried in hand or bull ladles by more than two men per ladle, the gangway shall be not less than 5 ft. wide.

Section 12. Where molten metal is carried in crane, trolley or sulky ladles, the gangway shall be sufficiently wide to allow employees safely to handle and empty the ladles.

Section 13. Where molten metal is carried in gangways on truck ladles exclusively, the gangway shall be not less than 18 in. wider than the extreme width of the truck.

Section 14. Where molten metal is carried in crucibles by not more than two men per crucible and poured into molds placed on one or both sides of the gangway, the gangway shall be not less than 3 ft. wide.

Section 15. Where molten metal is carried in crucibles by more than two men per crucible and poured into molds placed on one or both sides of the gangway, the gangway shall be not less than 4 ft. wide.

Section 16. Where molten metal is carried in hand or bull ladles or crucibles and poured into molds on individual floors by not more than two men per ladle or crucible, an aisle not less than 12 in. wide shall be provided, except where molds alongside the aisle are more than 20 in. high above the aisle level, in which case the aisle shall be not less than 20 in. wide.

Section 17. Where molten metal is carried in hand or bull ladles or crucibles and poured into molds on individual floors by more than two men per ladle or crucible, an aisle not less than 36 in. wide shall be provided.

Section 18. Where molten metal is carried and poured into molds on individual floors by crane, trolley or sulky ladles, an aisle shall be provided sufficiently wide to allow employees safely to handle and empty the ladles.

Section 19. Where the continuity of any gangway is interrupted by molds or other obstructions, the gangway shall be continued around such obstructions.

Section 20. Where molten metal is poured into molds located in a gallery, a solid partition not less than 3 ft. high shall be installed on the open side of such gallery.

IV. Light, Temperature and Ventilation

Section 21. The light in every foundry shall be sufficient to provide safe entrance and exit of employees and to carry on work safely during working hours.

Section 22. The temperature in every foundry shall be maintained at not less than 50 deg. Fahr. during working hours in all sections where employees are regularly working.

Section 23. Every foundry shall be so ventilated during working hours that smoke, gases, fumes or dust injurious to the health of employees shall, as far as practicable, be rendered harmless by means of natural circulation of air or by ventilating hoods, fans or other effective devices.

Section 24. Hand or bull ladle bowls shall not be dried inside the foundry, except in ovens or under ventilating hoods or by means of suitable oil or gas burners.

Section 25. No locomotive while discharging smoke shall remain inside a foundry during working hours except during such periods as may be necessary for its entrance and exit; but this regulation shall not apply to locomotive cranes.

Section 26. No foundry in which zinc-bearing metals are melted or poured shall hereafter be installed in a room less than 14 ft. in height from the lowest point of the ceiling to the floor, except that where the roof is of peak, saw-tooth, monitor or arch construction, the minimum height of the side walls may be 12 ft. If such foundry is installed in the front part of a building, the ceiling shall be in every part not less than 6 ft. 6 in. above the curb level of the street in front of the building; and if such foundry is installed entirely in the rear part of a building or extends from the front of a building to its rear, the ceiling shall be not less than 3 ft. above the curb level of the street in front of the building, and the foundry shall open on a yard or court which shall be not less than 6 in. below the level of the floor.

Section 27. If after this safety code is approved the operation of any foundry in which zinc-bearing metals are melted or poured shall be discontinued for not less than 15 consecutive days, it can thereafter be reopened for the same purpose only by complying with the provisions of Section 26.

V. Cleaning and Chipping Operations

Section 28. Where dry tumbling mills are used within a foundry, exhaust apparatus shall be installed and operated that will effectively draw off the dust created by the operation of such mills; or the mills shall be inclosed in reasonably dust-tight compartments while in operation.

Section 29. Where dry grinding, buffing or polishing machines are used, exhaust apparatus shall be installed and operated that will effectively draw off the dust created by the operation of such machines; but this regulation shall not apply to swing-frame or portable grinding machines.

Section 30. All castings shall, where practicable, be cleaned or chipped in rooms separated from rooms used for other purposes; but where castings are cleaned or chipped in molding or casting rooms, there shall be provided suitable screens, partitions or other effective means to protect employees against flying chips and excessive dust.

Section 31. Sand-blasting by hand-operated apparatus shall be carried on in suitable sand-blast rooms or outside the foundry, and in the latter case effective means shall be provided to protect passers-by from the sand-blast.

Section 32. The use of high explosives or of a drop for breaking scrap shall not be permitted unless done under reasonably safe conditions.

VI. Ladles and Crucibles

Section 33. All lip-pouring ladles of 2000 lb. capacity or more shall, within 2 years after this safety code is approved, be equipped with a worm geared or other self-locking tilting device. All crane ladles, truck ladles and trolley ladles shall be so constructed that, when they are full of metal, the center of gravity shall be below the center of the trunnions, unless each ladle is equipped with a gear mechanism and a latch, either of which will prevent premature overturn of the ladle.

Section 34. All single shank hand ladles shall be provided with sheet metal fenders.

Section 35. When the combined weight of a crucible containing molten metal and the crucible tongs exceeds 100 lb., the crucible shall be removed from the furnace by not less

than two men or by mechanical means, and when the combined weights exceed 300 lb., three or more men or mechanical devices shall be employed.

Section 36. When the crown plate of a rigid crucible furnace is located more than 12 in. above the surrounding floor, crucibles containing molten metal shall be removed from such furnace by mechanical means; or a suitable platform shall be installed, at least 4 ft. in width, extending along the front and sides of the furnace and not more than 12 in. below the crown plate. If such platform is located 12 in. or more above the floor at the point where crucibles containing molten metal are taken from it, the crucibles shall be lowered to the floor by mechanical means.

VII. Inspection of Appliances

Section 37. All ladles, ladle shanks, crucibles, crucible shanks, crucible tongs, yokes, skimmers and slag hoes used in pouring of molten metal shall, prior to their use, be inspected daily in regard to their safe condition by the men preparing and using such appliances. A monthly inspection in regard to the safe condition of all crane chains, cables, ropes and slings used for suspending molten metal in mid-air shall be made by a man designated by the employer for the purpose. Reports of such monthly inspections shall be made on forms furnished for the purpose.

VIII. Use of Protective Devices by Employees

Section 38. When the dust arising from cleaning operations may be injurious to the health of cleaners, they shall wear suitable respirators which shall be provided by the employer; when engaged in sand-blasting by hand apparatus, they shall in addition wear suitable helmets or hoods which shall be provided by the employer. When the eyes of employees are liable to injury by dust, flying chips or molten metal, employees shall wear suitable safety goggles which shall be provided by the employer. When engaged in welding or burning operations by means of an oxy-acetylene or other gas torch, employees shall wear suitable safety goggles which shall be provided by the employer; when engaged in similar operations by means of an electric arc, employees shall use suitable shields or wear suitable helmets which shall be provided by the employer. When handling molten metal, employees shall wear suitable Congress-type shoes which shall be provided by themselves; they shall also wear suitable leggings when these are provided by the employer.

IX. Employment of Females

Section 39. No female shall be employed in a foundry unless upon examination by a competent nurse or physician it has been determined that she is of normal health, size and weight.

Section 40. No female employed in a foundry shall lift any object exceeding 50 lb. in weight unless she uses mechanical means by which her physical effort is limited to 50 lb.

X. General Regulations

Section 41. Regulations affecting industrial establishments generally in respect to the safeguarding of transmission machinery, miscellaneous machinery, elevators, stairways, platforms, or relating to sanitary conveniences and first aid equipment, not included in this safety code, shall apply with equal force to foundries.

XI. Modification or Suspension of Regulations

Section 42. This safety code may be modified or suspended in whole or in part by the proper State authority in respect to existing foundries if good and sufficient reason therefor is submitted.

Pacific Coast Metal Trades

The tenth annual convention of the United Metal Trades Association of the Pacific Coast was held at Seattle, Wash., Saturday, April 22. Chief among matters of business was the adoption of uniform shop rules. The reports on safety work in machine shops and foundries of the members showed excellent results. The executive council was instructed to consider the advisability of issuing safety first bulletins. Eugene Roberts, Tacoma, Wash., was elected president; A. M. Clark, Portland, Ore., first vice-president; E. Johnson, Seattle, second vice-president; B. B. Truett, Spokane, Wash., third vice-president, and W. F. Prier, Portland, was re-elected treasurer. F. C. Porter is secretary of the association, with offices at Portland, Ore.

An initial dividend of 20 per cent has been paid to the creditors of the Victor Knecht Foundry Company, Cincinnati, Ohio, by F. M. Kelley, receiver. The company went into bankruptcy about a year ago.

Iron and Steel Markets

OVERSOLD STEEL MILLS

Tighter Conditions as to 1916 Deliveries

Rail Sales 800,000 Tons in Six Weeks—Large Foreign Inquiry for Bessemer Pig Iron

The oversold condition of leading steel producers and the tightening of the steel market so far as concerns deliveries this year are more plainly indicated by the developments of the past week. Leaving out rails, new buying has fallen off but mainly because of the definite efforts of sellers to repress demand.

Europe is seeking round lots of war steel for this year, and the situation has now gone beyond the point of fencing over the price; few large makers are in position to consider it at all. New capacity is under construction, but its expected output has been sold, perhaps in some cases more than once. The Duluth plant of the Steel Corporation is sold to the end of the year. New capacity in the Central West is also well pre-empted.

Without regard to the demand for particular finished products, the situation is still one of a scarcity of steel as steel, and indications are that prices for some months will be determined accordingly. In general the attitude of sellers both toward domestic and foreign buyers is that of letting the urgency of demand fix the price.

The rail advance of \$5 has been secured on 9000 tons sold by one mill. Some railroads scaled up their requirements beyond the average of recent years in trying to cover at the old price, with the result that offers of 200,000 tons were declined by Chicago mills and of 100,000 tons by the mill at Pueblo.

It is estimated that 800,000 tons of rails has been booked for next year in the past six weeks. Latest contracts include 24,000 tons additional for the Southern Railway, 20,000 tons for the Chicago & Eastern Illinois, 20,000 tons for the Burlington, in addition to a large lot placed in Colorado, 25,000 tons each for the Chesapeake & Ohio and the Reading, 5000 tons each for the Seaboard Air Line and the Chicago Great Western, 8000 tons for the Virginian Railway. The Steel Corporation's rail orders for the week were 110,000 tons and 35,000 tons was placed by frog and switch works for delivery this year.

Bolts and nuts and rivets are the leaders in the week's advance. In cutting off 10 per cent from bolt discounts actual advances have been from 15 to 25 per cent on former prices. Implement makers' contracts are pending and automobile demand has been unprecedented. Rivets are up \$10 a ton. Shafting has advanced \$5. Iron and steel pipe is \$4 higher and on some sizes the advance reaches \$12.

Western car works are operating at 50 to 75 per cent of capacity, and car buying falls off as prices

rise. To-day railroads are asked 100 per cent advance over the low price of last year. There is no sign of any relaxing in plate prices. Contract plates for second half have been placed at 3.50c. Two Eastern mills now ask 4c. Shipyard work is piling up. Seven vessels were placed last week, requiring 20,000 to 25,000 tons of steel, three for Norwegian owners.

With no further rise in prices, pig iron has shown good activity in spots. A radiator interest has bought upward of 50,000 tons, chiefly at Buffalo, and furnaces there have relatively little to sell for this year. St. Louis transactions include 50,000 tons of Southern basic, and Eastern malleable interests have taken 20,000 tons, while a steel works contract for hot metal represents 25,000 tons. An Eastern steel company which ordinarily sells basic iron has been a buyer. Reports of the inquiry for Bessemer iron from France have been exaggerated. About 60,000 tons is wanted, distributed over the year. On portions of this and of 40,000 tons for Italy bids of \$22 to \$24 at Valley furnace have been made. A Pittsburgh buyer has taken 20,000 tons of Bessemer at \$21 at Valley furnace.

It has not yet been decided whether the 10 per cent wage advance of the Steel Corporation is to apply to employees of the coke and iron mining subsidiaries.

FOR 1916, NOT 1917

By an error "1917" appeared in a statement in the iron and steel market summary on page 962 of the issue of April 20. The sentence should have read: "It is quite well established that British contracts already closed, including a large one placed late in March with the Steel Corporation, call for practically all the shell and shrapnel steel this country can supply in 1916."

Pittsburgh

PITTSBURGH, PA., April 25, 1916.

While generally admitted that the new demand for steel products has fallen off considerably, the mills are pushed as hard as ever for deliveries, and prices continue to advance. The past week tin plate was put up about 25c. per box; rivets, \$6 to \$10 per ton; cement coated nails, 10c. per keg; nuts and bolts, 10 to 15 per cent; shafting, \$5 per ton, and black and galvanized iron and steel pipe, from \$4 to \$12 on some sizes, and as high as \$18 to \$20 on two or three sizes of galvanized. The makers state that these advances were made, not with the expectation that consumers will come in and place contracts for delivery in four to six months, but rather with the object of discouraging new buying. The mills are now so congested with orders that to take more business would simply add to the trouble of trying to distribute the output and take care of customers. The tremendous output of the steel mills for many months has evidently not allowed them to catch up on deliveries to any extent. Complaints from customers are very frequent, not being able to get out a full product from their factories on account of slow deliveries of steel. This is particularly true of the sheet and tin-plate trade, the supply of sheet bars not being adequate. The pig-iron market is only fairly active, but

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

Fig Iron, Per Gross Ton:	April 26, 1916.	April 19, 1916.	Mar. 29 1916.	April 23, 1915.
No. 2 X, Philadelphia...	\$20.50	\$20.50	\$20.25	\$14.25
No. 2 Valley furnace...	18.50	18.50	18.50	12.75
No. 2 Southern, Cin'ti...	17.90	17.90	17.90	12.40
No. 2 Birmingham, Ala.	15.00	15.00	15.00	9.50
No. 2 furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, del'ed., eastern Pa.	20.50	20.50	20.00	13.25
Basic, Valley furnace...	18.00	18.00	18.25	12.50
Bessemer, Pittsburgh...	21.95	21.95	21.95	14.55
Bessemer, Ch'go*	19.50	19.50	19.50	13.00
Malleable Besse., Ch'go*	18.70	18.70	18.45	13.45
Gray forge, Pittsburgh...	19.75	19.75	19.75	15.75
L. S. charcoal, Chicago...				

Billets, etc., Per Gross Ton:	April 26, 1916.	April 19, 1916.	Mar. 29 1916.	April 23, 1915.
Bess. billets, Pittsburgh...	45.00	45.00	45.00	20.00
O.-h. billets, Pittsburgh...	45.00	45.00	45.00	20.00
O.-h. sheet bars, P'gh...	45.00	45.00	45.00	21.00
Forging billets, base, P'gh	68.50	68.00	65.00	25.00
O.-h. billets, Phila.....	50.00	50.00	50.00	22.02
Wire rods, Pittsburgh...	60.00	60.00	57.00	25.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	2.659	2.659	2.559	1.15
Iron bars, Pittsburgh...	2.50	2.50	2.40	1.20
Iron bars, Chicago.....	2.35	2.35	2.35	1.15
Steel bars, Pittsburgh...	3.00	3.00	2.75	1.20
Steel bars, New York...	3.169	3.169	2.919	1.369
Tank plates, Pittsburgh...	3.75	3.75	3.50	1.15
Tank plates, New York...	3.919	3.919	3.669	1.319
Beams, etc., Pittsburgh...	2.60	2.60	2.50	1.20
Beams, etc., New York...	2.769	2.769	2.669	1.369
Skelp, grooved steel, P'gh	2.35	2.35	2.30	1.12 1/2
Skelp, sheared steel, P'gh	2.45	2.45	2.40	1.17 1/2
Steel hoops, Pittsburgh...	3.00	3.00	3.00	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	April 26, 1916.	April 19, 1916.	Mar. 29 1916.	April 23, 1915.
Sheets, black, No. 28, P'gh	2.85	2.85	2.75	1.80
Galv. sheets, No. 28, P'gh	5.00	5.00	4.75	3.25
Wire nails, Pittsburgh...	2.40	2.40	2.40	1.55
Cut nails, Pittsburgh...	2.60	2.60	2.30	1.55
Fence wire, base, P'gh...	2.25	2.25	2.25	1.35
Barb wire, galv., P'gh...	3.25	3.25	3.25	2.10

Old Material, Per Gross Ton:

Iron rails, Chicago.....	18.00	18.00	18.00	11.75
Iron rails, Philadelphia...	20.00	20.00	20.00	14.00
Carwheels, Chicago....	23.50	14.00	14.50	9.75
Carwheels, Philadelphia...	17.00	17.50	17.50	11.00
Heavy steel scrap, P'gh...	17.25	17.75	18.50	11.75
Heavy steel scrap, Phila...	17.50	18.00	17.50	11.00
Heavy steel scrap, Ch'go...	16.50	16.50	16.75	9.25
No. 1 cast, Pittsburgh...	16.25	16.00	16.25	12.00
No. 1 cast, Philadelphia...	17.50	18.00	17.00	12.00
No. 1 cast, Ch'go (net ton)	12.75	12.75	13.50	9.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$2.00	\$2.25	\$3.25	\$1.50
Furnace coke, future....	2.40	2.50	3.00	1.65
Foundry coke, prompt...	3.25	3.50	3.75	2.00
Foundry coke, future....	3.25	3.25	3.50	2.15

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	28.75	28.75	27.12 1/2	21.00
Electrolytic copper, N. Y.	28.50	28.50	26.87 1/2	18.62 1/2
Spelter, St. Louis.....	18.00	19.00	17.50	13.75
Spelter, New York.....	18.25	19.25	17.75	14.00
Lead, St. Louis.....	7.37 1/2	7.62 1/2	8.00	4.10
Lead, New York.....	7.50	7.75	8.00	4.20
Tin, New York.....	49.75	51.00	50.00	42.00
Antimony, Asiatic, N. Y.	39.50	41.00	45.00	27.00
Tin plate, 100-lb. box, P'gh	\$4.50	\$4.50	\$4.25	\$3.25

prices are steady. Billets and sheet bars continue firm, with new demand light, consumers being covered on contracts. Coke and scrap are quiet and weak.

Fig Iron.—As yet nothing definite has been done with the inquiries from France and Italy submitted to nearly all merchant furnaces in this district about ten days ago, calling for 100,000 tons or more of Bessemer iron. Some of the merchant furnaces have given options on part of this amount, but at a wide range of prices, from \$22 to \$24, at Valley furnace, being quoted. These options are good until Thursday, April 27, and part of the iron may be closed for on that date. Reports are insistent that the Carnegie Steel Company, and perhaps one other large steel interest, will come in the market shortly for large blocks of both Bessemer and basic iron, but there is nothing tangible on which to base these reports. It is known that four or five large steel company blast furnaces in the Pittsburgh district may have to go out in possibly 60 days for relining and repairs. The Marshall Foundry Company of this city has closed for 20,000 tons of Bessemer iron to be used in making ingot molds, and may possibly buy 15,000 tons or more before this week is out. All this iron was bought at \$21 at Valley furnace, which is absolute minimum of the market, small lots having sold at \$21.50. Basic iron is quiet, consumers being covered. Very little is doing in foundry iron, largely because of the molders' strike, which has been going on for close to six months. Some foundry iron has been offered for resale in this market at lower prices than furnaces are quoting. We quote Bessemer iron at \$21; basic, \$18; gray forge, \$17.75 to \$18; malleable Bessemer, \$18.50 to \$19, and No. 2 foundry, \$18.50 to \$19, all at Valley furnace, the freight rate from furnace for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

Billets and Sheet Bars.—Not much new business is being done, consumers being covered by contracts, but deliveries of steel from the mills are very unsatisfactory. The output is heavy, but there is not enough steel to go around. By July 1 there will be a good deal more open-hearth capacity available, and this will help the situation as regards supply. A sale of 1500 tons of open-hearth billets for delivery over the next three months is reported at \$45 or higher, maker's mill. We

note a sale of 100 tons of ordinary carbon forging billets at \$68.50, f.o.b., Pittsburgh. For delivery over the second and third quarters we quote: Bessemer billets, \$45; open-hearth billets, \$45; Bessemer sheet bars, \$45, and open-hearth sheet bars, \$45, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at \$68.50 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

Steel Rails.—The first rail was rolled on Saturday, April 22, on the new No. 2 rail mill of the Carnegie Steel Company at Bessemer, Pa. This mill will roll from 100 to 150-lb. sections. No. 1 mill rolls from 40 to 100 lb., and No. 3 mill rolls light rails from 16 to 40 lb. These three rail mills, when a full supply of steel can be obtained, could roll close to 1,500,000 tons of rails per year, but at present the ingot capacity at the Edgar Thomson works, which is only 1,440,000 tons per year maximum, will not allow more than about 1,200,000 tons of rails to be rolled. These three rail mills are filled for the remainder of this year and have large contracts for 1917 delivery. The new demand for light rails is active, specifications and orders running over 6000 tons per week. We quote light rails as follows: 25 to 45-lb. sections, 2.10c.; 16 and 20 lb., 2.15c.; 12 and 14 lb., 2.20c., and 8 and 10 lb., 2.25c., in carloads and up to 100 tons. An advance of 5c. per 100 lb. is charged for less than carloads and down to three tons, while under three tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

Ferroalloys.—Several large cargoes of foreign ferromanganese have lately come in, amounting to 9000 tons or more, and the situation as regards immediate supply is better. However, there is still much uneasiness as to whether there will be enough ferromanganese to meet the demand when the summer months come. Prices ranging from \$400 to \$425 or higher are quoted on carload lots of 80 per cent for prompt shipment from stock. We quote 20 per cent spiegeleisen for forward delivery at \$70 to \$75 at furnace. Prices on 50 per cent ferrosilicon have not been changed, but the supply is inadequate to meet the demand promptly. Ruling prices on 50 per

cent ferrosilicon are \$85 up to 100 tons; over 100 tons and up to 600 tons, \$84, and over 600 tons, \$83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are as follows: 9 per cent, \$30; 10 per cent, \$31; 11 per cent, \$32; 12 per cent, \$33; 13 per cent, \$34.50; 14 per cent, \$36.50; 15 per cent, \$38.50, and 16 per cent, \$41. Seven per cent silvery for the same delivery is \$26.50; 8 per cent, \$27; 9 per cent, \$27.50; 10 per cent, \$28; 11 per cent, \$29, and 12 per cent, \$30. All these prices are f.o.b. at furnace, Jackson, Ohio; New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of \$2 per gross ton to Pittsburgh.

Structural Material.—The new demand has quieted down, due to the high prices ruling, and much work that could be put off has gone over until probably next year. The Jones & Laughlin Steel Company has taken 500 tons for an addition to the Webb Terminal in Philadelphia. The American Bridge Company has taken 800 tons of bridge work for the Southern Railway, and the Fort Pitt Bridge Works 500 tons for the same road. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, for delivery in third quarter and fourth quarter of this year. Small lots for prompt delivery from warehouse stocks are held at 3.25c. to 3.50c. and higher.

Plates.—It is evident that the output of plates at present is very much in excess of the new demand, but the mills are filled up for many months ahead on orders placed some time ago. Railroads are giving out few orders for steel cars, refusing to pay the high prices asked by the car builders, which are more than twice as high as they were a year ago. The Youngstown Sheet & Tube Company has withdrawn its recent inquiry for 150 cars. The Louisville & Nashville has placed 450 steel-underframe box cars and 400 steel-underframe gondolas with the Pressed Steel Car Company. Plates, ¼ in. and heavier, for prompt shipment range from 3.50c. to 4c. at mill, and some sales have been made at 5c. and higher. We quote ¼-in. and heavier plates for delivery at convenience of the mill, which would be in four to six months, at 2.65c. to 2.75c., and for delivery in two to three months, 3.50c. to 4c., maker's mill. Small lots of plates for prompt shipment have sold at 4c. to 4.50c. at mill.

Sheets.—Local makers insist that weakness in prices of light gage black sheets reported from other sections does not exist here. The new demand for blue annealed, electrical and deep stamping sheets is still heavy, local mills being well sold up for the entire year. On light gage black sheets some mills can make deliveries in eight to ten weeks; and on galvanized, ten to twelve weeks. There is still trouble in getting sheet bars promptly, and some sheet mills usually shut down on Saturday each week, waiting for steel to accumulate. We quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3c.; No. 28 Bessemer black, 2.85c. to 2.90c.; open-hearth, 2.95c. to 3c.; No. 28 galvanized Bessemer stock, 4.90c. to 5c., and open-hearth, 5c. to 5.10c., most mills holding for the higher prices on both grades. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.70c.; Nos. 25, 26 and 27, 2.75c.; No. 28, 2.85c.; No. 29, 2.95c., and No. 30, 3c. These prices are for carload and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—Specifications are very heavy and but little tin plate is available on new orders for delivery this year. Export inquiry is fairly heavy; one mill has sold 40,000 boxes at \$5.25 per base box, f.o.b. Pittsburgh. On new orders tin plate from stock is bringing \$4.75 to \$5 per base box. Some of the larger mills report they have practically nothing to sell for this year, and are compelled to turn away orders from regular customers for additional plate. The output this year and the prices obtained will no doubt break all records. We quote small lots from stock at \$4.75 to \$5 per base box, prices depending on sizes, quantity and deliveries wanted. We quote 14 x 20 coke plates at \$4.50 per base box, and 8-lb. coated ternes at \$7.50 for 200 lb. and \$7.80 for 214 lb., all f.o.b. maker's mill, Pittsburgh.

Cold-Rolled Strip Steel.—Additional contracts for delivery in third quarter of this year are being placed. Makers report that the high prices ruling have not had

any effect in cutting down orders. On small lots for shipment at convenience of the mill, which would be in 8 to 10 weeks, \$7 to \$8 is being quoted. We note a contract for 100 tons and another for 300 tons for third quarter at \$6 per 100 lb., base. The new demand is very heavy, and most makers are well sold up through third quarter. Standard extras now ruling were given on page 810 in THE IRON AGE of March 20.

Skelp.—The demand is heavy and local mills state they are sold up over the next four or five months. Prices are very firm, and likely to be higher. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Wire Products.—Intimations are that an advance of \$4 per ton on all wire products will be announced within a few days, likely to take effect May 1. Several makers of nails state that on most new orders they are getting \$2.50, base, an advance of 10c. over the regular price. Prices on cement coated nails have been advanced 10c. per keg, or to \$2.50, base. The new demand for wire products is heavy, jobbers and consumers trying to cover as far ahead as possible before an advance in prices is made. On 8d. and 10d. wire nails, the supply is not equal to the demand, and the mills are very much back in deliveries. Prices now in effect are as follows: Wire nails, \$2.40; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50; plain annealed wire, \$2.25; galvanized barb wire and fence staples, \$3.25; painted barb wire, \$2.55; polished fence staples, \$2.55; cement coated nails, \$2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots; 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—Local makers are out of the market as sellers, having their entire output of rods for the next five or six months either under contract or needed for their own wire mills. Quite often foreign inquiries come in this market for rods, but local mills do not quote on these, as they cannot make deliveries. A sale of 300 tons of open-hearth rods for fairly prompt shipment is reported at above \$60 per ton. We quote Bessemer, open-hearth and chain rods at nominally \$60 at mill.

Railroad Spikes.—New inquiry is more active. In addition to the roads noted in this report last week that are in the market for spikes, one Eastern road is inquiring for 30,000 to 40,000 kegs and another for 15,000 kegs. All these inquiries are for 1917 delivery, but the railroads are very slow in closing, refusing to pay the high prices now quoted by the makers. On the other hand, the latter say they are not anxious to close so far ahead at any lower prices, as they can put the steel into other products for which there is an active demand at high prices. We quote:

Standard railroad spikes, 4½ x 9/16 in. and larger, \$2.65 to \$2.75; railroad spikes, ½ and 7/16 in., \$2.75 base; railroad spikes, ¾ in. and 5/16 in., \$3.05 base; boat spikes, \$2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Rivets.—While the nominal price of structural rivets for some time has been \$3.25 and of boiler rivets \$3.35 per 100 lb., several makers state they have been getting 10c. per 100 lb. more, so that the new prices, effective from April 20, of \$3.75 for structural rivets and \$3.85 for boiler rivets, really represent an advance of \$8 and not \$10 per ton. Both foreign and domestic demand continues heavy, and shipments of carloads and larger lots of rivets to South America, India and elsewhere abroad are frequent. Deliveries of steel to the rivet makers are slow, checking the output to some extent. For immediate shipment and on contracts up to and including Sept. 30, 1916, structural rivets are quoted at \$3.75 and boiler rivets at \$3.85, per 100 lb., base; for fourth quarter of 1916, structural rivets are quoted at \$4 and boiler rivets at \$4.10, per 100 lb., base, f.o.b. Pittsburgh, terms 30 days net, or one-half of 1 per cent for cash in 10 days.

Nuts and Bolts.—Effective Thursday, April 20, prices on nuts and bolts were again advanced from 10

to 15 per cent. Makers say that still higher prices are likely in view of the high cost of steel bars and of the fact that deliveries of bars from the mills are hard to obtain. The output is somewhat restricted for the latter reason. The demand, both domestic and export, is heavy. Shipments into New England are now going forward freely. The new discounts, which makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., with terms 30 days net or 1 per cent for cash in 10 days.

Carriage bolts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 5.

Machine bolts, h.p. nuts, small, rolled thread, 50, 10 and 10 per cent; small, cut thread, 50 and 10; large, 40, 10 and 5.

Machine bolts, c.p.c. and t. nuts, small, 50 per cent; large, 35 and 10.

Blank bolts, 40, 10 and 5 per cent; bolt ends, with h.p. nuts, 40, 10 and 5 per cent; with c.p. nuts, 35 and 10. Rough stud bolts, 20. Lag screws (cone or gimlet point), 60.

Forged set screws and tap bolts, 15 per cent. Cup and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or flister head cap screws, 35.

Nuts, h.p. sq., tapped or blank, \$2.90 off list; hex., \$2.90 off; c.p.c. and t. sq., tapped or blank, \$2.60 off; hex., \$3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Shafting.—Prices have again been advanced \$5 per ton, three or four local makers now quoting at 15 per cent off minimum for carloads and larger lots. On small lots 10 per cent off, and, in a few cases, base prices are quoted. Local makers of shafting are practically sold out for remainder of this year, and premiums are being offered for small lots for spot shipment. We quote cold-rolled shafting at 15 per cent off in carloads and 10 per cent in less than carloads, f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars.—Steel bar mills are practically sold up for the remainder of the year, but one or two mills have a limited amount to sell for delivery in third and fourth quarters. On these deliveries 2.50c. to 2.75c. is quoted, but on small lots for prompt shipment as high as 3.25c. at mill is quoted. Mills rolling iron bars report the new demand very active and prices firm, some makers refusing to sell for delivery more than 60 days ahead. Large export inquiries for steel rounds still come to this market, but, aside from one contract taken several weeks ago, inquiries are being turned down, as the mills cannot make the deliveries wanted. We quote steel bars at 2.50c. to 2.75c. for delivery in third and fourth quarters, and 3c. to 3.25c. for delivery in second quarter. From warehouse stock 3.25c. and up to 3.50c. is quoted. We quote common iron bars at 2.50c. to 2.60c., and railroad test bars at 2.60c. to 2.70c. at mill.

Hoops and Bands.—Nominal prices on steel hoops are 2.75c. and on steel bands 2.60c. to 2.75c. for such deliveries as the mills could make, which would be in four or five months. For fairly prompt shipment, steel hoops are held at 3c. and bands at 2.75c. to 3c., at mill.

Merchant Steel.—Mills have their output for remainder of this year practically sold up, and, in spite of heavy output, are back in deliveries 10 to 12 weeks or longer. On small lots for delivery at convenience of the mill, which would be in four to six months or longer, prices are about as follows: Iron finished tire, 1/2 x 1 1/2 in. and larger, 2.35c., base; under 1/2 x 1 1/2 in., 2.50c.; planished tire, 2.55c.; channel tire, 3/4 to 1 in. and 1 in., 2.85c. to 2.95c.; 1 1/4 in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Wrought Pipe.—The advance on April 15 of \$2 per ton on oil country goods has been followed by heavy advances in black and galvanized iron and steel pipe, effective from April 21. On steel pipe the advance is \$4 per ton on butt black; \$6 butt galvanized; \$6 on lap black pipe, 2 to 6-in.; \$8 on galvanized 2 to 6-in.; \$4 on lap black pipe, 7 to 12-in., and \$6 on galvanized 7 to 12-in. Large O. D. pipe is put up \$10 per ton. Line

pipe is advanced \$2 to \$4 per ton. On black and galvanized iron pipe the advances are much heavier, ranging from \$8 on most sizes to as much as \$22 per ton on a few. On some sizes of steel pipe several makers have advanced prices more heavily than noted above, these makers evidently asking premiums on such sizes. Manufacturers report the demand abnormally heavy and say their output is sold up for the next three months or longer. Several have entered three times as much business in pipe so far this year as in the same period last year. The new discounts will be found on another page of this issue.

Boiler Tubes.—Nearly all makers state that on locomotive and merchant tubes they are sold up for practically the remainder of the year. Most large consumers covered some time ago through second and third quarters, and some are covered through the entire year. Premiums on early deliveries on both iron and steel boiler tubes are said to be easily obtainable when a mill can make the shipment desired. Discounts on iron and steel boiler tubes are given on another page.

Carwheels.—The two local makers of carwheels are filled up for this year and are not quoting on new orders except for delivery in first quarter and first half of 1917. We quote 33-in. freight carwheels in lots of 1000 or more at \$18; 33-in. tender wheels, \$22; 36-in. passenger or tender wheels, \$26. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Old Material.—Large consumers have all the scrap they will need for some time and are out of the market. Dealers are not trying to press sales, believing prices will be better soon, and the result is the local scrap market is not active. Prices on nearly all grades have gone off from 50c. to 75c. per ton. An embargo on scrap routed to the Allegheny Steel Company at Brackenridge, Pa., has been declared. Some dealers believe that the leading interest will come in the market before long for a large lot of scrap, and if this proves to be true prices would very quickly be higher. The new demand for borings and turnings for blast furnace use has fallen off very much, and prices are lower. We note sales of 2000 tons of selected heavy steel scrap at \$17.50, delivered Youngstown, also 800 to 1000 tons of turnings at \$10.25 and \$10.35, 300 tons of cast scrap at \$16.25, 400 tons at \$16.50, also 250 tons of low phosphorus scrap at \$20.50. Dealers quote for delivery in the Pittsburgh and near-by districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$17.25 to \$17.50
No. 1 foundry cast	16.25 to 16.50
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	17.50 to 17.75
Hydraulic compressed sheet scrap	15.50 to 15.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	13.75 to 14.00
Bundled sheet stamping scrap	13.00 to 13.25
No. 1 railroad malleable stock	15.50 to 16.00
Railroad grate bars	12.50 to 12.75
Low phosphorus melting stock	20.50
Iron car axles	26.50 to 27.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	29.00 to 29.50
No. 1 busheling scrap	15.50 to 15.75
Machine shop turnings	10.25 to 10.50
Old carwheels	15.00 to 15.25
Cast-iron borings	10.25 to 10.50
*Sheet bar crop ends	18.00
No. 1 railroad wrought scrap	19.50 to 20.00
Heavy steel axle turnings	13.50 to 13.75
Heavy breakable cast scrap	14.50 to 14.75

*Shipping point.

Coke.—The slump in prices and demand continues, and coke is being offered at the lowest prices reached for a very long time. There is no demand for prompt furnace coke and best grades are offered at \$2 to \$2.25 per net ton at oven. Blast furnaces that were on the point of negotiating recently for coke for last half of the year delivery have pulled out, and producers are not trying to make contracts under present unfavorable conditions. While \$2.50 is quoted on contracts, furnaces refuse to pay this price and say they will wait. We now quote best grades of furnace coke for prompt

shipment at \$2 to \$2.25, and on contracts from \$2.40 to \$2.50 per net ton at oven. We quote best grades of 72-hr. foundry coke at \$3 to \$3.25 for prompt shipment, and from \$3.25 to \$3.50 on contracts. The Connellsville *Courier* gives the output of coke in the Connellsville region for the week ended April 15 as 462,920 net tons, a decrease over the previous week of 274,411 tons.

Chicago

CHICAGO, ILL., April 26, 1916.—(By Wire.)

A phase of the policy of the mills with respect to rails is indicated in the declining last week of offers aggregating 200,000 tons at Chicago and 100,000 tons at Pueblo, notwithstanding some of this business is intended to provide for specific railroad work. Apparently it is not proposed that more than normal requirements shall be covered at the lower price. Tie-plates have sold at \$50 per ton and light rails are advanced in the West \$2 per ton. The situation in which car builders find themselves as the result of the special conditions which have operated against them is particularly interesting. Their operations are at a rate scarcely exceeding 60 per cent, and it is even possible that a continuance of the present deadlock will result in complete shutdowns of car plants in the last half of the year. The curtailment of investment building already commented upon is increasingly in evidence. Mill sales of finished steel products in general continue in excess of shipments from week to week but analysis shows that bookings are of two extreme kinds—the very large tonnages, as rails, and the small orders for quantities up to 200 tons. There is a marked dearth of business of intermediate size. The advance in the price of bolts announced last week is generally associated with the pendency of implement contracts and doubtless will be followed by a closing of that business on the basis of the previous schedule of prices. Premium business recently placed has included a number of orders from iron and steel jobbers who appear to be sparing no effort to maintain their stocks to meet the requirements of immediate shipments. The pig-iron market is resting none too easily. In the South the producers' position is far from strong, and it is not yet apparent to what extent the Northern market may be affected by that weakness. The Northern furnaces are comfortably sold up through the year, with a chance for a decidedly stronger position in the event of a buying movement in steel-making iron. Southern iron has sold for first quarter delivery 1917 at \$16.25, Birmingham.

(By Mail)

Pig Iron.—Inquiry for Southern iron for 1917 delivery made its appearance last week, and the furnaces have indicated their willingness to consider such business by quoting prices ranging from \$16 to \$16.50, Birmingham. A large implement interest is prominent among those who are considering purchases so far in the future. The asking of a premium for first quarter delivery is in contrast with the quotations made by Northern furnaces on the same basis for first quarter as had ruled for last half shipments. This comparison is the more interesting in view of the fact that whatever strength the pig-iron market may have or may be expected to develop has its basis least of all in the condition of Southern producers. Although Southern furnaces have sold heavily enough for the first half of this year to reduce their stocks of regular grades of iron to a low point, and are even finding themselves able to market accumulations of off-iron at desirable prices, they are hardly delivering iron to ultimate consumers at a rate equal to production, and for the last half have yet to sell a very large tonnage. Predictions of a shortage in iron find more support in the status of Northern producers. But even among users of Northern irons, a survey of the situation indicates that requirements have already been covered, in many instances in excess of normal purchases, and there remains at the same time no apparent inability on the part of producers to readily cover current inquiry for fill-in purposes. Merchant producers have been facing the possibility of a demand for steel-making iron, and the future course of the market is largely predicted upon what may

eventuate in that direction. The advancing of the quotation for basic iron to a minimum of \$19.50 by some of the furnace interests may be taken as indicating something of what is anticipated. A third furnace in this district is added to the list of probabilities for early relining. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b., furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 f'dry and 1 soft	\$19.50 to 20.00
Southern coke, No. 2 f'dry and 2 soft	19.00 to 19.50
Malleable Bessemer	19.50
Basic	19.00 to 19.50
Low phosphorus	34.00 to 36.00
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent	33.50

Rails and Track Supplies.—The natural desire of the railroads to get under the tent with as liberal a provision for their rail requirements as possible, prior to the imposition of the higher price, was further manifested in heavy inquiry last week. Reports from Colorado state that offers totaling 100,000 tons for 1917 delivery were declined by the Pueblo mill, while at Chicago unsuccessful efforts were made to have at least double that amount placed on the books, some of it for delivery as far ahead as 1918. While most of this inquiry represented merely the desire to cover requirements, some of it, particularly one lot of 75,000 tons, is desired for specific extension work. Contracting for track fastenings has been continued. A purchase of 1800 tons of iron tie-plates at \$50 per ton, the seller taking railroad scrap at \$20 per ton in exchange, is noted. The Western market for light rails, which has been consistently behind conditions prevailing in the East, is strengthening and an advance of \$2 per ton is announced. We have revised our quotations as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, \$50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c. to 1.47½c., base; open hearth, 1.34c. to 1.56½c.; light rails, 25 to 45 lb., 1.80c.; 16 to 20 lb., 1.85c.; 12 lb., 1.90c.; 8 lb., 1.95c.; angle bars, 1.50c. to 1.75c., Chicago.

Structural Material.—New sales of structural steel have been reduced to a minimum. Though the closing of contracts for fabricated steel has not been shut off to as great an extent, practically no business of this character is being undertaken which involves the necessity of buying material from mill. Contracts closed last week include 660 tons for the Missouri Pacific Railroad, taken by the American Bridge Company, which will also furnish 1700 tons for the Illinois Steel Company plant extensions and 500 tons for a bridge in Humboldt County, California. The Minneapolis Steel & Machinery Company took 450 tons for the Garfield Smelting Company; the Chicago Bridge & Iron Company, 330 tons for a Chicago pumping station, and the Wisconsin Bridge & Iron Company, 220 tons for the St. Joseph Lead Company. The position of the car builders is an interesting one, in that their operations probably do not exceed 75 per cent of capacity in any instance, and in some cases are as low as 50 per cent. Most of the car builders could offer prompt delivery of cars were the price and availability of raw material favorable. We quote for Chicago delivery of structural steel from mill, 2.639c.

Prompt delivery requirements of structural steel can be supplied from practically only two sources, fabricators' stocks or jobbers' stocks. The limited demand for structural material finds warehouse stocks, in practically all cases, ample for the needs of a larger business than is current. We quote for Chicago delivery of plain material from jobbers' stocks 3.10c.

Plates.—While a sale of 800 tons of plates at a price of 4c., Chicago, is noted, the average transaction which smaller lots are involved is on the basis of 3.5c. Pittsburgh, and fill-in orders for quantities up to 100 tons, for second and third quarter delivery, have been taken at 3.25c. There is a sustained demand for plates

in small lots for delivery within 90 days. The Pullman Company has taken the order of the Seaboard Air Line for ninety-two passenger cars. We quote for Chicago delivery of plates from mill on contracts 2.939c., and for prompt shipment 3.50c.

Some of the recent transactions in plates at premium prices are evidence of the efforts jobbers are making to maintain their plate stocks on a basis equal to the exceptional demand out of store. With the increasing restriction of tonnage available from the mills that have catered to prompt shipment demands, the business out of store may be expected to still further increase. We quote for Chicago delivery of plates out of stock 3.50c.

Sheets.—The sheet situation presents few changes. Demand is largely, as it has been for a number of weeks, for heavy gages such as required for the automobile trade, with a variable demand for one-pass sheets. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.189c.; box annealed, No. 17 and higher, 3.089c. to 3.189c.; No. 28 galvanized, 4.939c. to 5.189c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 16 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—Some business in high-carbon steel bars has been taken on the basis of 2.75c., but the prices on most of the orders taken have been lowered. For bar iron an occasional quotation against an inquiry for prompt shipment material runs above 2.35c., but orders can be readily placed at that price. The filling of new demands for mild steel bars is a closed question. We quote mill shipments, Chicago, as follows: Bar iron, minimum, 2.35c.; soft steel bars, 2.639c.; hard steel bars, 2.50c. to 2.75c.; shafting, in carloads, 25 per cent off; less than carloads, 20 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 15 per cent off.

Rivets and Bolts.—Another advance in the prices of bolts and nuts, amounting to a cut in discounts of from $7\frac{1}{2}$ to 10 per cent, is announced. The quotations to the implement interests for last half contracts on the basis of the previous schedule of prices may now be expected to effect a general closing of this business. The size and persistence of inquiry for bolts and nuts from the automobile trade are astonishing and seem not to be deterred in the least by the extremely high prices asked. For some of the materials for which there is now large inquiry in the market, the best deliveries quotable are eight months, as against quotations of four months' deliveries for the regular lines. Rivet prices for business of Western origin have not followed the full advance effective at Pittsburgh, and quotations of 3.50c., Chicago, still prevail. We have revised our quotations as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, \$2.90 off per 100 lb.; hexagon, \$2.90 off. Structural rivets, $\frac{3}{4}$ to $1\frac{1}{4}$ in., 3.50c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 65-5; larger sizes, 65; carriage bolts up to $\frac{3}{4}$ x 6 in., 65; larger sizes, 50-15 off; hot pressed nuts, square, \$3.70, and hexagon, \$3.80 off per 100 lb., lag screws, 65-10-5.

Wire Products.—On a few wire specialties, such as cement coated and railroad nails, an advance in prices is announced this week, but for the standard products our previous quotations to jobbers continue in force as follows: Plain wire, No. 8 and coarser, base, \$2.439; wire nails, \$2.589; painted barb wire, \$2.739; galvanized barb wire, \$3.439; polished staples, \$2.739; galvanized staples, \$3.439, all Chicago.

Cast-Iron Pipe.—The American Cast Iron Pipe Company was the successful bidder for 1400 tons at Highland Park, Mich. Inquiry includes 225 tons for Antigo, Wis., 200 tons for North Milwaukee, Wis., 300 tons for Middletown, Ohio, and 200 tons for Lakewood, Ohio. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$33.50 to \$34; 6 in. and larger, \$30.50 to \$31, with \$1 extra for class A water pipe and gas pipe.

Old Material.—The scrap market continues to drag, with a gradual softening of prices. The weakness in carwheels, which were sold last week as low as \$13.25, and of machine shop turnings, the quotations for which are still further reduced, is particularly noticeable. Conditions existing among the dealers who participated in the sales of wrought scrap during the last movement appear to be such as to assist in the maintenance of the price of this grade of material, and it is unlikely that No. 1 wrought could be purchased for any less than \$17. Recent sales of railroad scrap have not been easily effected, the demand being very sluggish. New offerings include 7250 tons from the Rock Island, of which 1000 tons is made up of steel rails and 1000 tons carwheels, and 3000 tons from the Burlington, with small lists from one or two other roads. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$18.00 to \$18.50
Relaying rails	19.50 to 20.50
Old carwheels	13.50 to 14.00
Old steel rails, rerolling	18.00 to 18.25
Old steel rails, less than 3 ft.	19.00 to 19.50
Heavy melting steel scrap	16.50 to 17.00
Frogs, switches and guards, cut apart	16.50 to 17.00
Shoveling steel	15.50 to 16.00
Steel axle turnings	11.25 to 11.75

Per Net Ton	
Iron angles and splice bars	\$18.50 to \$19.00
Iron arch bars and transoms	19.75 to 20.25
Steel angle bars	15.75 to 16.00
Iron car axles	24.00 to 24.50
Steel car axles	26.50 to 27.00
No. 1 railroad wrought	17.00 to 17.50
No. 2 railroad wrought	15.75 to 16.00
Cut forge	15.50 to 16.00
No. 1 busheling	13.75 to 14.25
No. 2 busheling	9.75 to 10.25
Pipes and flues	12.25 to 12.75
Steel knuckles and couplers	15.50 to 16.00
Steel springs	16.00 to 16.50
No. 1 boilers, cut to sheets and rings	11.75 to 12.25
Boiler punchings	14.00 to 14.50
Locomotive tires, smooth	18.75 to 19.25
Machine shop turnings	7.25 to 7.50
Cast borings	7.00 to 7.50
No. 1 cast scrap	12.75 to 13.25
Stove plate and light cast scrap	10.75 to 11.25
Grate bars	11.00 to 11.25
Brake shoes	11.25 to 11.50
Railroad malleable	13.75 to 14.25
Agricultural malleable	11.25 to 11.75

Philadelphia

PHILADELPHIA, PA., April 25, 1916.

A significant indication of the extent to which steel-making iron is being consumed is seen in the action of the Bethlehem Steel Company in entering the market to arrange for deliveries of basic to consumers to whom it had previously sold such iron. As yet no extremely large tonnage is involved, but the trade regards the situation with great interest. A Reading, Pa., producer and consumer, whose furnace has been out of blast for a couple of months, and whose stock was low, has purchased a round lot of gray forge. The export inquiry for Bessemer and low phosphorus is heavy, but some of the specifications, as well as the difficult ocean freight conditions, are not conducive to business. Spot ferromanganese is a trifle easier, although but little is offered. Coke and old material are weaker. The steel situation shows but little change. Prices are firm in every direction, and plate and bar makers continue to turn business away. Excellent results are being obtained with steel discarded in the process of making shell rounds. It has been found adaptable for forgings and for rolling into bars and rods. The Pennsylvania Steel Company took orders for 24,885 tons of steel rails in the past week.

Pig Iron.—The Bethlehem Steel Company has been in the market for second quarter basic to be shipped to other consumers in place of the company's own iron, indicating that it has need of all it can make. In one case 6000 tons was purchased for such delivery, the steel company and not the consumer to be billed. It is not stated what price the steel company paid, but it is understood that the transaction entailed a loss of about \$3 a ton. It is believed that the company will buy at least 10,000 to 12,000 tons. It has sold none for last half delivery. The prices generally quoted for prompt basic range from \$20.50 to \$21, delivered.

although higher is asked. Two or three small inquiries are before the trade and one has been withdrawn. A Reading company closed in the week for a round lot of gray forge at a price not under \$19.50 delivered. This grade has been more or less of a drug on the market, not only because of few buyers, but also because of an increase in its production. The recent irregularity in the coke supply, due to the freight congestion, has caused runs of off-iron with unpleasant frequency. The Reading company inquired for 10,000 tons, but is not believed to have taken all of that quantity. The Pennsylvania Railroad closed for 600 tons of high manganese and 700 tons of charcoal iron, third quarter. Charcoal iron has continued fairly active. Foundry iron has been quiet, although a steady business has been done. Quotations are unchanged at \$20.50 to \$21 for eastern Pennsylvania, some makers asking over \$21. Virginia producers have been enabled by the easier freight conditions to make some delayed shipments into New England and elsewhere. Export inquiries totaling many thousands of tons are before the trade, but in some cases the specifications are not attractive, as where an exceptionally low per cent of phosphorus is stipulated. The bulk of the inquiries are for Bessemer, of which the French Government wants about 50,000 tons. Scotch and Italian interests want several thousand tons of standard low phosphorus. Italy also wants Bessemer. If shipping conditions were normal a large business could be done with foreign buyers, and as matters are, considerable will be done. Standard low phosphorus continues firm at \$34 to \$35, Philadelphia, and Lebanon low phosphorus at \$30 to \$32, furnace. Sales have been confined to small lots. Quotations for standard brands, delivered in buyer's yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry.....	\$20.50 to \$21.00
Eastern Pa., No. 2 plain.....	20.25 to 20.75
Virginia, No. 2 X foundry.....	21.25
Virginia, No. 2 plain.....	20.75
Gray forge.....	19.50
Basic.....	20.50 to 21.00
Standard low phosphorus.....	34.00 to 35.00

Iron Ore.—In the week ended April 22 6460 tons of ore arrived here, coming wholly from Cuba.

Ferroalloys.—No radical change is reported, although there is some evidence of ease in the quotation for spot 80 per cent ferromanganese. It has been held at \$400, seaboard, but small lots are being offered at \$400, Pittsburgh. This material is in casks. Last quarter is quoted at \$200, seaboard, and first half at \$175, the taking of orders being contingent on their acceptance by the makers in England. Last week 666 tons of English 80 per cent ferromanganese arrived here. Bessemer ferrosilicon is quoted at \$36.44, Philadelphia, for 10 per cent and \$37.44 for 11 per cent. Contract ferrosilicon, 50 per cent, stands at \$83 to \$85, Pittsburgh.

Plates.—Makers continue to quote 3.75c., Pittsburgh, or 3.909c., Philadelphia. Prompt deliveries are almost impossible to obtain even at premium prices. One leading maker continues to turn business away, and is concentrating on the care of regular customers. Another, whose output is more restricted in point of variety, is booking some third-quarter contracts. Some English consumers who did not specify in the time agreed upon when they placed their orders are somewhat aggrieved because they cannot now get deliveries at the contract price.

Bars.—The situation is as tight as ever and steel bars continue nominal at 2.909c., Philadelphia. Iron bars are unchanged at 2.659c., Philadelphia.

Steel Rails.—In the past week the Pennsylvania Steel Company took orders for steel rails as follows: Virginian Railway, 8000 tons; Western Maryland, 2000 tons; Jacksonville Terminal, 3000 tons; Chesapeake & Ohio, 10,000 tons; Springfield Street Railway and Worcester Consolidated Railway (jointly), 1400 tons, and Berkshire Street Railway, 485 tons.

Structural Material.—Bids are in for 600 tons of steel required for the Stotesbury residence in this city. Another local proposition, but one which has not been entirely formulated, is a building for the Colonial Trust Company, Thirteenth and Market streets. It is in the

hands of a New York architect. The bulk of business consists of miscellaneous small propositions, repair work, etc. The quotation is strong at 3c., Pittsburgh, or 3.159c., Philadelphia.

Billets.—Steel discarded (not rejected) in the process of making shell rounds is being found most acceptable by some makers of forgings, also for rolling into smaller diameters and squares. It is sold as billets at prices ranging from \$60 to \$70 per ton. Although the carbon content runs from 35 to 45 per cent, $\frac{1}{2}$ -in. and $\frac{3}{4}$ -in. rounds and squares have been bent flat, cold, without fracture. Labor trouble at a rolling mill has also been the cause of some prompt billets appearing in the market. Open-hearth rerolling billets are unchanged at \$50 to \$55, and forging steel at \$65 to \$70.

Sheets.—The demand continues good and prices are firm at 3.909c. to 4.159c., Philadelphia, for No. 10 blue annealed.

Coke.—The market is weak for the reason that shipments which were held up in transit are now being delivered. New business has been light. Spot furnace coke is quoted at \$2.25 to \$2.50 per net ton at oven, and contract at \$2.50 to \$2.75. Spot foundry is quoted at about \$3.25 per net ton at oven, and contract at about \$3.50. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—Deliveries are being more freely made and the mills are well supplied. Railroad car demurrage quickly mounts up and no time is lost in unloading cars, all of which has caused mill stocks to grow. Prices show a lower tendency quite generally. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$17.50 to \$18.00
Old steel rails, rerolling.....	19.00 to 20.00
Low phos. heavy melting steel scrap.....	22.50 to 23.25
Old steel axles.....	26.00 to 27.00
Old iron axles.....	28.00 to 29.00
Old iron rails.....	20.00 to 20.50
Old carwheels.....	17.00 to 17.50
No. 1 railroad wrought.....	23.00 to 23.50
Wrought-iron pipe.....	14.50 to 15.00
No. 1 forge fire.....	15.25 to 15.75
Bundled sheets.....	15.25 to 15.75
No. 2 busheling.....	11.00 to 11.50
Machine shop turnings.....	10.00 to 10.50
Cast borings.....	11.00 to 11.50
No. 1 cast.....	17.50 to 18.00
Grate bars, railroad.....	13.50 to 14.00
Stove plate.....	13.50 to 14.00
Railroad malleable.....	14.50 to 15.00

Buffalo

BUFFALO, N. Y., April 25, 1916.

Pig Iron.—Sales for the week have aggregated between 80,000 and 90,000 tons, for a variety of grades and extended deliveries. It is said that no part of the heavy tonnage placed is export business, for which inquiry was reported last week. The American Radiator Company, which has been negotiating for 30,000 to 35,000 tons of foundry iron, has placed a portion of its requirements with Buffalo producers this week, included in the total sales above mentioned. There still remains unfilled inquiry for about 25,000 tons from other melters, principally for foundry. The total of orders reported above closely approaches the saturation point of Buffalo district furnace productive capacity to the end of the year. In some instances furnaces have already been obliged to decline good-sized orders on account of their sold-up condition to the end of the year. One or two selling interests have stiffened to a minimum of \$19 for any grade. We quote as follows for current and last half delivery, f.o.b. furnace, Buffalo:

No. 1 foundry.....	\$19.50 to \$20.00
No. 2 X foundry.....	19.00 to 19.50
No. 2 plain.....	18.75 to 19.00
No. 3 foundry.....	18.75 to 19.00
Gray forge.....	18.50 to 19.00
Malleable.....	19.00 to 20.00
Basic.....	19.50 to 20.00
Bessemer.....	21.00 to 22.00

Finished Iron and Steel.—There has apparently been little new buying during the week, most mills having no

unbooked space for taking on new business, having nothing to sell up to the end of the year. The American Bridge Company has the contract for 4000 tons of structural steel for the 22-story Statler Hotel at St. Louis.

Old Material.—With the exception of wrought scrap, for which there is good inquiry, the demand continues light. It is apparently the policy of consumers to hold off placing orders, except at reduced prices. Dealers, however, are maintaining the present price list level except that in a few instances concessions have been made on small lots on cars that had to be moved. They prefer to keep material in stock to selling at concessions. Embargoes at different points are still in effect, which has a tendency to stagnate trade. We continue last week's schedule of dealers' asking prices as follows, per gross ton, f.o.b., Buffalo:

Heavy melting steel	\$17.50 to \$18.00
Low phosphorus steel	21.00 to 21.50
No. 1 railroad wrought scrap	19.00 to 19.50
No. 1 railroad and machinery cast scrap	16.00 to 16.50
Old steel axles	24.00 to 24.50
Old iron axles	24.00 to 24.50
Old carwheels	15.25 to 15.75
Railroad malleable	16.00 to 16.50
Machine shop turnings	8.50 to 9.00
Heavy axle turnings	12.50 to 13.00
Clean cast borings	9.25 to 9.75
Old iron rails	18.00 to 18.50
Locomotive grate bars	12.00 to 12.50
Stove plate (net ton)	11.50 to 12.00
Wrought pipe	14.00 to 14.50
Bundled sheet scrap	13.00 to 13.50
No. 1 busheling	15.00 to 15.50
No. 2 busheling	12.00 to 12.50
Bundled tin scrap	15.00 to 15.50

Cincinnati

CINCINNATI, OHIO, April 26, 1916.—(By Wire.)

Fig Iron.—It is reported, but not yet definitely confirmed, that the bulk of Northern resale iron that has been available at \$18.50, Ironton basis, for this year's shipment, is now out of the way. The furnace price is firm at \$19, and a few late contracts have been made at this figure, although for small amounts. An Indiana melter bought 400 tons for fourth quarter delivery. Although \$20, Ironton, is quoted for shipment in the first half of next year, \$19 can be done, as some of the producers in that district are willing to take on some back log orders for that delivery. Southern No. 2 foundry is quoted at \$15, Birmingham basis, for delivery up to July 1. Rumors have been circulated that a few contracts have been accepted at the same figure for delivery through the remainder of this year, but these cannot to-day be substantiated, and \$15.50 is quoted for last half shipment and from \$15.50 to \$16 for the first half of next year. One maker is holding for \$16.50 for that delivery. Most buyers in this vicinity are fairly well supplied for this year's wants, but a few of them will have to come in the market soon for sufficient iron to run them through the last half. The Ohio silvery irons are quoted at \$29 at furnace for 8 per cent silicon, but the former price of \$27 can still be done. No general inquiries for silicon iron are out, and sales are limited to carload quantities. Basic and malleable are both quiet but firm. Generally speaking, the market lacks snap, and neither buyers nor sellers are making any strenuous efforts just now to change the situation. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	\$18.40 to \$18.90
Southern coke, No. 2 f'dry and 2 soft	17.90 to 18.40
Southern coke, No. 3 foundry	17.40 to 17.90
Southern No. 4 foundry	16.90 to 17.40
Southern gray forge	16.40 to 16.90
Ohio silvery, 8 per cent silicon	28.25 to 28.75
Southern Ohio coke, No. 1	21.26
Southern Ohio coke, No. 2	20.26
Southern Ohio coke, No. 3	19.76
Southern Ohio malleable Bessemer	20.26
Basic, Northern	20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	25.40 to 25.90

(By Mail)

Coke.—Prices on spot coke are soft. Connellsville furnace coke can be bought at \$2.25 or lower, but \$2.50 per net ton at oven is the average figure quoted here. Contract Connellsville furnace coke ranges from \$2.50

to \$2.75. Foundry grades are around \$3.50 to \$3.75 for either prompt or future shipment, although a few brands are still held as high as \$4. Prices in the Wise County and Pocahontas districts are practically the same, but New River foundry coke is bringing a premium of 25c. to 50c. per ton. Very little business is reported in either furnace or foundry coke, and none of importance is in sight.

Finished Material.—The demand for reinforcing concrete bars and structural shapes is brisk. The present quotations have not yet cut off business, and the most serious proposition confronting the trade is that of getting prompt shipments. However, the local warehouses have a fairly good supply on hand and ordered, and other centers probably feel the effect of the shortage in a much greater degree. Lately the retail hardware dealers have placed orders for wire nails and barb wire to replenish stocks that were fast being depleted. We quote jobbers' prices as follows: Wire nails, \$2.65 per keg, base; barb wire, \$3.50 per 100 lb.; plain steel bars, 3.20c.; twisted steel bars, 3.35c.; No. 10 blue annealed sheets, 3.50c.; plates, 3.50c.; small structural shapes, 3.20c. The near-by mills are quoting No. 28 galvanized sheets around 5.15c. to 5.20c., Cincinnati or Newport, Ky., and No. 28 black sheets from 3.15c. to 3.25c.

Old Material.—Prices are not as firm as they were at this time last week, and reductions averaging about 25c. per ton have been made on practically all grades of scrap. The incoming shipments are now ahead of the outgoing, and quite a large quantity of scrap is said to be available for prompt movement, but dealers are not disposed to pile up any further yard stocks. The minimum figures given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton	
Bundled sheet scrap	\$12.50 to \$13.00
Old iron rails	16.50 to 17.00
Relaying rails, 50 lb. and up	21.75 to 22.25
Revolving steel rails	15.50 to 16.00
Heavy melting steel scrap	14.75 to 15.25
Steel rails for melting	14.00 to 14.50

Per Net Ton	
No. 1 railroad wrought	\$14.00 to \$14.50
Cast borings	6.25 to 6.75
Steel turnings	6.25 to 6.75
Railroad cast scrap	11.75 to 12.25
No. 1 machinery scrap	13.50 to 14.00
Burnt scrap	8.50 to 9.00
Iron axles	20.25 to 20.75
Locomotive tires (smooth inside)	17.50 to 18.00
Pipes and flues	10.25 to 10.75
Malleable and steel scrap	11.50 to 12.00
Railroad tank and sheet scrap	9.25 to 9.75

Cleveland

CLEVELAND, OHIO, April 25, 1916.

Iron Ore.—Shipments are starting off with a rush and the April movement will probably reach 1,000,000 tons. The first cargo was shipped from Escanaba and reached Buffalo April 22. The first Lake Superior cargo was shipped from Ashland April 21. A large number of boats are now at Duluth and other Lake Superior ports taking on cargoes. It is not yet definitely known whether the 10-per cent advance in wages announced last week by the Steel Corporation will include employees in the mines of the Oliver Iron Mining Company, but whether the employees of the Steel Corporation's mines will be granted this advance in addition to one made several weeks ago will probably be known within a few days. Other mining companies are much interested in this, as, if the Steel Corporation raises the wages of its miners another 10 per cent, the advance will probably be made general throughout the mining districts. At present the labor supply is plentiful at the mines and some men are being turned away, the recent advance in wages having brought in considerable outside labor. Operations in open pit mines were started last week, the railroads furnishing a supply of cars in order to enable the mines to get a good start before navigation opened. However, operations were seriously interfered with, particularly in the Mesaba district, by very severe rain storms that continued for three days. We quote ore prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45;

Mesaba Bessemer, \$4.20; Old range non-Bessemer \$3.70; Mesaba non-Bessemer, \$3.55.

Pig Iron.—The market in this territory is quiet, but Cleveland agencies are taking considerable business in other districts. One reports sales for the week aggregating between 50,000 and 60,000 tons. Inquiries include one for 20,000 tons of Bessemer for shipment to France on which a Cleveland interest has quoted \$24. The Cleveland Furnace Company has advanced its price to \$19.50 at furnace for No. 2 foundry, making a spread of \$1 a ton in quotations by local producers for out of town shipment. The Valley price for foundry iron is unchanged at \$18.75. The car shortage is interfering somewhat with shipments. Southern iron is quiet. Some inquiry is coming out for contracts for first half but these appear to be largely market feelers. We quote Southern iron at \$15 to \$15.50, Birmingham, for No. 2 for prompt shipment, \$15.50 last half and \$16 for first half of next year. We quote delivered Cleveland as follows:

Bessemer	\$21.95 to \$22.45
Basic	19.20 to 19.30
Northern No. 2 foundry	19.30 to 19.80
Southern No. 2 foundry	19.00 to 19.50
Gray forge	18.75
Jackson Co. silvery, 8 per cent silicon	30.62
Standard low phos., Valley furnace	32.00

Coke.—The market is inactive. There is little inquiry for foundry coke contracts, although some foundries have not yet covered for their last half requirements. We quote standard Connellsville foundry coke at \$3.50 per net ton at oven for shipment during the year from July 1, \$3.50 to \$3.75 for last half and \$3.75 to \$4.25 for prompt shipment. Furnace coke for prompt shipment continues weak and is quoted around \$2.25.

Bolts, Nuts and Rivets.—The expected advance in bolt and nut prices went into effect April 20, being 10 to 15 per cent. Rivet prices have been advanced \$10 a ton to 3.75c., Pittsburgh, for structural rivets and 3.85c. for boiler rivets for early shipment and third quarter. Bolt and nut makers are closing contracts for third quarter at the new prices. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{8}$ x 6 in., smaller or shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger or longer, 40 and 5; machine bolts with h. p. nuts, $\frac{3}{8}$ x 4 in., smaller and shorter, rolled thread, 50, 10 and 10; cut thread, 50 and 10; larger and longer, 40, 10 and 5; lag bolts, gimlet or cone point, 60; square h. p. nuts, blank or tapped, \$2.90 off the list; hexagon, h. p. nuts, blank or tapped, \$2.90 off; c. p. c. and t. square nuts, blank or tapped, \$2.60; hexagon nuts, all sizes, \$3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Finished Iron and Steel.—New business in round lots is coming out in a moderate volume and the demand for steel from warehouses continues heavy. Warehouse stocks are greatly depleted, particularly in plates and small channels. Some additional contracts have been placed by agricultural implement makers for steel bars at 2.25c., Pittsburgh, for last half. In structural lines the American Bridge Company has taken 1000 tons for the West Ninth Street terminal warehouse in Cleveland. Bids will be taken this week for 3500 tons for the Bond Hotel, Toledo, Ohio, to replace the Boody House. An inquiry is out from the Brier Hill Steel Company, Youngstown, for a building for its 32-in. jobbing mill. Some open-hearth billets have been sold by a local mill at \$46, Cleveland, for May and June delivery. The Cambria Steel Company has advanced its prices on forging billets to \$85. The demand for plates is heavy, and Cleveland mills are getting considerable inquiry for plates for export. Local sellers quote at 3.50c. to 4c., Pittsburgh, for delivery in three to six weeks. The demand for boiler plates is moderate, Ohio boiler shops not being crowded with work at present. One mill is selling hard steel bars at 2.85c., Pittsburgh. We quote iron bars at 2.50c., Pittsburgh. The demand for sheets has increased and several Ohio mills have their output sold so far ahead that they are out of the market. Prices are very firm. We quote black sheets at 3c. to 3.15c., Ohio mill, for No. 28; blue annealed at 3c. to 3.10c. for No. 10, and galvanized at 5c. to 5.15c. for No. 28. Warehouse prices are unchanged at 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Old Material.—The market continues dull and weak. Prices generally are about 25c. a ton lower than a week ago. About all transactions are between dealers. There is a congestion of scrap at many of the mills, and there are no indications of an early buying movement. Considerable scrap is being offered. Heavy steel scrap is quoted at \$17 in this market, a decline of 25c. a ton, and sales are reported as low as \$16.75. Borings are a drag on the market and are quoted lower than turnings. We quote f.o.b. Cleveland as follows:

Per Gross Ton

Old steel rails	\$17.00
Old iron rails	19.00
Steel car axles	26.00
Heavy melting steel	17.00
Old carwheels	\$13.75 to 14.00
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.25 to 14.75
Railroad malleable	17.00 to 17.50
Steel axle turnings	13.25 to 13.50
Light bundled sheet scrap	13.25 to 13.50

Per Net Ton

Iron car axles	\$23.00 to \$24.00
Cast borings	7.50 to 7.75
Iron and steel turnings and drillings	7.75 to 8.00
No. 1 busheling	14.00 to 14.50
No. 1 railroad wrought	17.00 to 17.50
No. 1 cast	14.00 to 14.50
Railroad grate bars	11.75 to 12.00
Stove plate	11.25 to 11.50

St. Louis

ST. LOUIS, Mo., April 24, 1916.

Pig Iron.—The sales of the week include one of 3000 tons of malleable, one of 500 tons of Lake Superior charcoal iron and quite a number of 300 tons and under. One very large inquiry is outstanding at this writing, 30,000 tons of basic, half Northern and half Southern. Prices have been well held and are firmer. On ferromanganese one quotation for about 1000 lb. was on the basis of \$500 per ton.

Coke.—Practically no business of consequence is reported. A carload of beehive product was sold on a basis of \$5 per ton, Connellsville, to meet urgent needs.

Old Material.—The scrap market softened under the pressure of railroad material recently put out. This has been especially true of steel. On rolling mill grades, the prices have been better held. Mills are in a waiting mood, and railroads are inclined to sell at somewhat reduced prices under the conditions existing. Lists out include 1500 tons from the Terminal Railroad Association and 4000 tons from the Chicago, Burlington & Quincy. We quote dealers' prices, f.o.b. consumer's works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	\$17.00 to \$17.50
Old steel rails, re-rolling	17.00 to 17.50
Old steel rails, less than 3 ft.	16.50 to 17.00
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	12.75 to 13.25
No. 1 railroad heavy melting steel scrap	16.00 to 16.50
Heavy shoveling steel	14.25 to 14.75
Frogs, switches and guards cut apart	15.50 to 16.00
Bundled sheet scrap	10.25 to 10.75

Per Net Ton

Iron angle bars	\$16.00 to \$16.50
Steel angle bars	13.50 to 14.00
Iron car axles	23.50 to 24.00
Steel car axles	25.50 to 26.00
Wrought arch bars and transoms	19.25 to 19.75
No. 1 railroad wrought	16.00 to 16.50
No. 2 railroad wrought	15.75 to 16.00
Railroad springs	15.50 to 16.00
Steel couplers and knuckles	14.25 to 14.75
Locomotive tires, 42 in. and over, smooth inside	18.75 to 19.25
No. 1 dealers' forge	12.00 to 12.50
Cast borings	8.00 to 8.25
No. 1 busheling	13.50 to 14.00
No. 1 boilers, cut to sheets and rings	9.25 to 9.75
No. 1 railroad cast scrap	12.00 to 12.50
Stove plate and light cast scrap	9.00 to 9.50
Railroad malleable	11.25 to 11.75
Agricultural malleable	10.25 to 10.75
Pipes and flues	10.50 to 11.00
Railroad sheet and tank scrap	9.75 to 10.25
Railroad grate bars	9.00 to 9.50
Machine shop turnings	8.75 to 9.25

Finished Iron and Steel.—Specifications on contracts have been free, but little new business has appeared owing chiefly to deferred deliveries. The Wabash is reported to have decided not to place its recently pro-

posed order for locomotives, because of the high prices asked for the deliveries wanted. Movement out of warehouse has been very free at the following prices: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 2.30c.; No. 28 galvanized sheets, black sheet gage, 5.50c. On both black and galvanized sheets 10c. lower is quoted for orders in excess of 25 bundles.

Birmingham

BIRMINGHAM, ALA., April 24, 1916.

Pig Iron.—The largest reported transaction is a sale of 4500 tons to an Eastern dealer at \$15, spot delivery. A lot of 1000 tons of mixed grades for second half delivery brought \$15.50. Several small lots for spot delivery went at \$15.50 and high manganese and high silicon iron at \$16 and \$17. The leading interest is quoting \$15 and \$15.50 for spot and second half No. 2 foundry. The inquiry for basic metal is rather brisk, and, while it is still quoted on a basis of No. 2 foundry, advances are expected in the near future. The Woodward Iron Company and the Alabama Company are in the market only in a limited way and the Central Coal & Iron Company has declined to make any quotations for the second half. If a small amount of resale iron has changed hands under market quotations, no furnace iron apparently has been thus sold. The increase in producing capacity expected in the second half of the year from the new Sloss-Sheffield furnaces and those of the Alabama and Woodstock companies may not materialize until late in the year owing to the delay in receiving machinery. For that reason none of these companies will say when these stacks will start. However, the Sloss-Sheffield will soon have another City furnace in blast, giving it six active stacks. The Vanderbilt stack of the Woodward Iron Company is to come in prior to July 1, but No. 1 will go out for repairs. It is clearly indicated that the Woodward Company has orders for basic on hand sufficient to keep its 400-ton stack going indefinitely after it starts on basic in July. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	.....\$15.50 to \$16.00
No. 2 foundry and soft	.....15.00 to 15.50
No. 3 foundry	.....14.50 to 15.00
No. 4 foundry	.....14.25 to 14.75
Gray forge	.....14.00 to 14.50
Basic	.....15.00 to 15.50
Charcoal	.....22.50 to 23.00

Cast-Iron Pipe.—Shop operations are based on such a continuous run of business that steadiness is the rule. The situation in the Anniston soil pipe field has improved with the granting of some wage increases, and it looks as if the end of the labor trouble there was in sight. Water and gas pipe foundries are busy. The South American water pipe business booked and in sight for Birmingham makers is believed to be over 20,000 tons. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$29; 6-in. and upward, \$25, with \$1 added for gas pipe and 16-ft. lengths. One interest quotes \$1 per ton above these prices, based, it is stated, on a stronger demand.

Old Material.—Dealers have moved a great deal of scrap the last few weeks and there are few yards with a large accumulation. Steel scrap is strong, but cast, owing to the large quantity offered, is not quite so active and has eased off somewhat. Several changes were made in quotations this week, but generally the scrap market is more inclined to stability than in some time. We quote per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	.....\$18.00 to \$19.00
Old steel rails	.....14.00 to 14.50
No. 1 steel scrap	.....11.00 to 11.50
No. 1 wrought scrap	.....13.50 to 14.00
No. 1 cast scrap	.....11.00 to 11.50
Heavy cast scrap	.....10.50 to 11.00
Stoveplate and light	.....10.00 to 10.50
Old carwheels	.....12.00 to 12.50
Tram carwheels	.....10.25 to 10.75

Coal and Coke.—Coke is firm at the advanced prices. Brookwood and Yolande are selling at \$4.50 per net ton, f.o.b. oven, with a demand that readily absorbs the

entire output. Furnace coke may be had at \$3.25 to \$3.50, but is scarce. The Southwestern and Pacific trade, as well as the trade with foundries generally, is excellent. The product of beehives started by the Woodward Iron Company is for its own use. The car situation has improved.

New York

NEW YORK, April 26, 1916.

Pig Iron.—Business closed in the conventional way—that is, as the result of general inquiries by buyers and after the receipt of various bids—has been light, but as the result of negotiations with two or three important buyers some large contracts have been put through. Noteworthy is the buying of the American Radiator Company for the first half of 1917 and for the latter part of this year. Its total purchases for plants in various parts of the country range above 50,000 tons, and with what has been taken by two other buyers it is probable the 100,000-ton mark has been reached in these large contracts. A New York railroad supply company which bought 1500 tons last week is still in the market for 4000 tons. In New England some good-sized business is pending, and a large malleable interest there is about to close for a round lot. Buffalo furnaces are now quite well sold for this year, one interest there, which has not been as free a seller in the last two months as some others, having now booked up the greater part of its capacity for the second half. The embargoes in New England having been lifted, foundries are getting cumulative shipments. In a few cases where the buyers are finding difficulty in handling so much iron in a short time furnaces have been asked to ease up on shipments, but as a rule the users are taking in all the metal that comes, as a safeguard against a renewal of the embargo. A considerable hot metal transaction is reported with a New York State steel company as buyer. The Pennsylvania Railroad bought 4600 tons from one furnace which can make ready shipments to Altoona. We quote at tide-water for early delivery: No. 1 foundry, \$21 to \$21.25; No. 2X, \$20.50 to \$20.75; No. 2 plain, \$20.25 to \$20.50; Southern iron at tidewater, \$20.75 to \$21 for No. 1 and \$20.25 to \$20.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—The spot market for standard ferromanganese is easier and the demand is decidedly less. Some small lots have been sold and it is obtainable at \$400, delivered. Further sales of British at \$175, seaboard, for delivery in the first half of 1917 have been bringing the total sold this year for such delivery to 20,000 tons and probably more. It is reported, but not confirmed, that British alloy can be obtained for last half at \$300, seaboard, and for last quarter at \$200 and also that some 70 per cent material has been sold at about \$167, seaboard. Most British makers, however, have little to offer this side of July 1, 1917. While the plans for increased domestic production have had little effect yet on the market, it is understood there are offerings at \$225, seaboard, for last half. The whole situation is improved and the anxiety is much less. Spiegeleisen, 20 per cent, is quoted at \$60 to \$65 for last half delivery and not as high as \$70 to \$75, as reported in some quarters. The demand for spot spiegeleisen is very slight, with no quotations or sale reported. The 50 per cent ferrosilicon market is higher, quotations on recent contracts for the remainder of 1916 being \$86 to 88, Pittsburgh, an advance of \$3 per ton. The demand is very strong with deliveries on contract in arrears. The low grade ferrosilicon market is strong and high. Ten per cent is quoted at \$33 per ton, furnace; 11 per cent at \$34, and 12 per cent at \$35, while 13 to 14 per cent material is bringing \$40 a ton and 14 to 15 per cent, \$42, furnace. The demand is active especially from some users of pig iron whose silicon content is lower than normal.

Cast-Iron Pipe.—The United States Cast Iron Pipe & Foundry Company has been awarded the Niagara Falls contract for 2423 tons of 4 to 36 in. at \$32, delivered, for the 4-in. and \$29 for the 6 to 36 in. Bid will be opened on a variety of lettings as follows:

Peekskill, N. Y., April 27, on 176 tons of 6 and 12-in.; Holyoke, Mass., April 27, 100 tons of 6 to 10-in.; Peabody, Mass., May 4, on 200 tons of 6 to 12-in., and commissioners of the District of Columbia, May 8, on 1495 tons of 20-in. On the Perth Amboy letting, on which bids were opened April 19 on about 100 tons, the Warren Foundry & Machine Company was low bidder. At Rochester, N. Y., April 19, the same company was low bidder on the entire quantity of 12,000 tons of 37-in., but the Warren Foundry & Machine Company bid a slightly lower price on 6000 tons. The question as to whether the contract will be placed as a whole or divided between the two companies is expected to be decided some time to-day or to-morrow. Bids submitted at the same time on riveted steel pipe were opened, but the prices named were higher than on cast-iron pipe. Private buying is well sustained. Prices show an upward tendency, especially on flange pipe, but carload lots of bell and spigot, 6-in., class B and heavier, are still to be had at \$30.50 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

Structural Material.—Not only does industrial plant work for immediate construction continue to come into the market without regard to the price, but there is a considerable number of apartment house and loft building projects under consideration and likely to be closed in the immediate future. There are probably fifteen such structures involving as many thousands of tons of steel work. The rapid advances in prices in recent months are shown in a number of municipal projects and other government work which are so slow in coming to the point of bidding that contractors' figures are considerably in excess of those of the engineers' estimates. The trade is not concerned with the deterrent effect of high prices or deferred deliveries on general construction work. So much is in sight and so well occupied are the fabricating shops that the future is being allowed to take care of itself. Of the new work in the market mention may be made of the Ritz Realty office building, Broadway and Twenty-first Street, 1000 tons; a school at Portland, Me., 850 tons; a building for the Southern New England Telephone Company, New Haven, Conn., 1000 tons; an apartment at Madison Avenue and Seventy-second Street, 1200 tons; a building for the Geographic Society, 155th Street and Broadway, 1000 tons. The Lehigh Valley Railroad is in the market for 1500 tons of bridge work in addition to the 500 tons on which bids have been taken and the New York Connecting Railway will require 2000 tons of transmission poles. The awards of the week include 350 tons for the filter house of the National Sugar Refining Company to the Hedden Iron Construction Company; 400 tons for the Waclark Wire Company, Bayway, N. J., to Milliken Bros., Inc.; 400 tons for the custom house at Wilmington, N. C., to the Eastern Steel Company; 600 tons for the Traylor Engineering Company, Allentown, Pa., to the McClintic-Marshall Company, and 600 tons for a coal pocket for the Baltimore & Ohio at Baltimore to the Hedden Iron Construction Company. Some 300 tons for the New York Air Brake Company at Watertown, N. Y., is reported closed; Milliken Bros., Inc., is said to have 200 tons for further bridge work in Cuba, and there is at least one 900-ton building project in New York closed, but the details withheld, as has been the case for some time in connection with much of the building work in New York. The Pennsylvania Steel Company is low on 2500 tons for the Department of Docks of New York for two piersheds at West Fifty-six Street and West Fifty-seventh Street. The advances of the week include \$3 per ton out of warehouse and a substantial advance in boiler and structural rivets, at least \$10 per ton from one mill for immediate and third quarter delivery and \$5 still higher for delivery in fourth quarter. We quote plain material in ten to twelve weeks at 2.769c. to 3.169c., New York, and 3.25c. out of New York district warehouses.

Steel Plates.—A further amount of contracting for third and fourth quarters, mostly for the third quarter, by large industrial establishments has gone on at 3.50c., Pittsburgh. Quite a total tonnage is involved. One of the Eastern plate mills is now at 4c., Pittsburgh, mini-

mum, but with little available for delivery this year. It appears that the mills are at least five to six weeks behind in deliveries on contracts. Pressure on the mills for deliveries is a feature and this is a condition without heavy railroad car buying. About the only car contracts to report are 850 underframes for the Louisville & Nashville taken by the Pressed Steel Car Company and 250 more tank cars for the Union Tank Line, placed with the American Car & Foundry Company. Plates out of warehouse are \$5 per ton higher, and we quote mill shipments at 3.919c. and 4.669c., New York, for what little is available this quarter, and out of warehouse, 4.25c., New York.

Iron and Steel Bars.—Railroads are showing a desire to cover for track accessories for the year 1917, and meanwhile bolts and nuts have been advanced from 10 to 25 per cent and in one or two cases as high as 45 or 50 per cent. Warehouse prices for steel and iron bars are \$3 a ton higher, making these 3.25c. out of New York warehouse. For larger lots buyers seem unwilling to pay above 3c. at mill, and a round lot of steel available for bars has not yet found takers. A falling off in foreign inquiries is reported, and also in new inquiries. For mill shipment we quote steel bars at 2.769c. to 2.919c., New York, for deferred delivery and iron bars from mill at 2.669c., New York, in about two and one-half months.

Old Material.—While prices are slightly lower in eastern Pennsylvania, the decline has not been sufficient to affect the market in this vicinity. Transactions are light in most classes of old material, however, and the outlook is not reassuring for the immediate future. The supply is ample of nearly every grade. An important exception is in the case of relaying rails, which are scarce and dearer, partly by reason of the railroads not receiving good deliveries of new rails from the mills and partly in sympathy with the announced advance on new rails to take effect May 1. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap (railroad or equivalent)	\$15.50 to \$15.75
Yard heavy steel (eastern Pa. specifications)	15.00 to 15.50
Relaying rails	27.50
Rerolling rails	17.25 to 17.50
Steel car axles (for domestic use)	27.50 to 28.00
Steel car axles (for export)	30.00
No. 1 railroad wrought	21.50 to 22.00
Wrought-iron track scrap	19.00 to 19.50
No. 1 yard wrought, long	17.00 to 17.50
No. 1 yard wrought, short	16.00 to 16.50
Light iron	6.75 to 7.00
Cast borings (clean)	9.50 to 9.75
Machine shop turnings	8.50 to 9.00
Mixed borings and turnings	8.00 to 8.25
Wrought pipe	13.00 to 13.50
Old carwheels	16.00 to 16.50
Malleable cast (railroad)	12.75 to 13.25

Foundries are quite regularly taking small quantities of cast scrap. Quotations to consumers are as follows, per gross ton, New York:

No. 1 cast (machinery)	\$18.00 to \$18.50
No. 2 cast (heavy)	16.50 to 17.00
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

The Lehigh Valley Railroad Company is 70 years old. Its original charter bears the date of April 21, 1846. The Pennsylvania Railroad Company was 70 years old April 13, and is, therefore, about a week older than the Lehigh Valley. Both roads are thriving very well at three-score and ten. A small part of the Lehigh Valley Railroad, as it now exists, really had its start 86 years ago, in the Beaver Meadow Railroad & Coal Company, which was merged into the Lehigh Valley Company, July 8, 1864. Its line extended from Mauch Chunk to Penn Haven, thence to Beaver Meadow and adjoining coal mines.

British exports of locomotives in 1915 were the smallest since 1912. Last year they were valued at £2,476,407, against £3,840,262 in 1914 and £2,137,198 in 1912. The falling off in 1915 from 1914 was principally in those made to Argentina, British India and Australia.

British Steel Market

Paralysis of Export Business—American Semi-Finished Steel Scarce

(By Cable)

LONDON, ENGLAND, April 26, 1916.

Export business is paralyzed owing to the recent prohibition, but allied governments' requirements are considered. Hematite iron is 140s. and tin plates are strong at 34s., while Welsh bars have sold at £13. Foreign semi-finished steel is nominal and only a few American offers are made, with business very difficult. Quotations of some products, partly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 24s. against 23s. 6d., last week.
Cleveland pig-iron warrants, 86s. 6d.
Steel black sheets, No. 28, export f.o.b. Liverpool, £19 15s.
Hematite pig iron, f.o.b. Tees, about 140s. compared with 139s. a week ago.
Sheet bars (Welsh) delivered at works in Swansea Valley, £13, against £13 10s. two weeks ago.
Steel bars, export, f.o.b. Clyde, £18 5s.
Ferromanganese, £35, nominal.
Ferro-silicon, 50 per cent, c.i.f., £29 compared with £27 a week ago.

Maximum Prices Fixed for Pig Iron—American Tin Plate Under Domestic Prices

(By Mail)

LONDON, ENGLAND, April 7, 1916.—An accentuation of the severe stringency which has characterized the iron market for some time past still exists, although the price tendency is very irregular. The constant depletion of reserve stocks of Cleveland material and the growing difficulty of home consumers in securing supplies has had an important bearing on the export market, the price now quoted for No. 3 Cleveland iron being nominally 98s. to 100s. The big advance is partly the result of the pressure exercised by the local committee of munitions to check exports and thus protect the home trade. Makers are very short of iron and mostly unwilling to quote for forward delivery, and in the warrant market the attitude of holders is more obdurate than ever, prices having been bid up steadily without drawing sellers. The growing scarcity of iron, which begins to look serious, is not imaginary, for the shortage of labor militates against any extension of operations by furnace owners. Probably strenuous efforts will be made under government control to meet the urgent needs of allied countries, but the placing of an embargo on exports to neutrals is considered inevitable. The stocks were, in the last month, reduced by about 25,000 tons, and are now perilously low. The huge margin between the home trade price which remains at 82s. 6d. and that quoted for export, indeed, speaks for itself.

Hematite iron shows hardly any change, and is well under control, while home consumers' needs are duly protected at the fixed maximum price of 122s. 6d. Government arrangements regarding the regulation of freights are making themselves felt. Allied countries' needs, too, are having attention on the basis of about 140s., but neutrals are virtually overlooked. The market for ferromanganese has remained unaltered though makers are very bare of stock. Good orders have been booked for next year's shipment to America.

MAXIMUM PRICES FOR PIG IRON

An official announcement states that maximum prices for pig iron have been fixed until June 30, 1916, and thereafter until further notice. The makers may sell for delivery after June 30, 1916, on the understanding that the fixed maximum prices ruling on the first day of any month during the period of the contract will apply to all deliveries made during that month. The maximum prices are based upon the abnormal costs and conditions now prevailing, and must not be assumed to be indicative of any difference in relative values which may have obtained in the several

districts before the war, and may obtain again after the war. The maximum prices, all per ton net f.o.b. maker's works, are:

Hematite pig iron, mixed, Nos. 1, 2 and 3, West Coast, £6 7s. 6d.; East Coast, Scotch and Welsh, £6 2s. 6d. Special quality containing under 0.03 per cent of phosphorus and sulphur, £6 15s. 6d., and qualities containing under 0.02 per cent of phosphorus and sulphur, £7. Lincolnshire pig iron, basic or foundry, £4 7s. 6d.; Cleveland, mixed, Nos. 1, 2 and 3, £4 2s. 6d.; Northamptonshire, forge, £4 2s. 6d.; foundry, £4 5s.; Derbyshire, forge, £4 5s.; foundry, £4 7s. 6d.; North Staffordshire, forge, £4 10s.; foundry, £4 12s. 6d.; basic, £4 15s.; South Staffordshire, part mine forge, £4 10s.; part mine foundry, £4 12s. 6d.; common Staffordshire, £4 5s.; all mine forge, £5 10s.; all mine foundry, £5 15s.; warm air forge, £7; warm air foundry, £7 10s.; special quality Lord Dudley's silicon, £7 17s. 6d.; cold blast iron, £8 17s. 6d. Scotch foundry and forge, Nos. 3 and 4, and lower grades of Monkland, Dalmellington, Eglington, and Govan, £5 14s.; Nos. 3, 4 and lower grades of all other brands, £5 15s. 6d. and No. 1 quality in all cases to be 5s. per ton above these prices.

STRICT GOVERNMENT CONTROL OF STEEL WORKS

The chronic scarcity of semi-finished steel is still due to the ever-increasing government requirements. Welsh bars are practically unobtainable for near delivery and the current quotation of £13 10s. for domestic consumers is nominal. British makers of billets have apparently nothing to offer for near months, while American importations are more difficult than ever through lack of freight facilities.

In finished steel the execution of war contracts monopolizes attention, the mills operating at their fullest capacity. The recent blizzard has seriously interfered with operations. The congestion is now such that the placing of new business is increasingly difficult, while the works are under strict government control. The tendency of prices is stronger than ever, a further advance having been enforced for steel strip, steel hoops and iron and steel rivets. Steel basic bars now stand at £18 net.

The run of business in tin plates has been curtailed and prices have been soaring daily, with most makers holding aloof owing to the crucial question of steel. The fact deserves notice that American plates are being offered for prompt shipment to this side on the basis of 25s. 8d. for 112 sheets 100 lb., c.i.f. Liverpool, for prompt shipment, which is much under quotations for the home product.

Open-Hearth Valve Mechanism for Saving Gas

A valve mechanism for shutting off the gas and stack draft in open-hearth furnaces while reversing, and thus preventing loss of gas, has been patented by Louis N. McDonald, of Youngstown, Ohio (U. S. 1,170,301—Feb. 1, 1916). The patentee proposes, in order to prevent such losses, to connect two sliding valves in the flues, one to shut off the flow of gas and the other the stack draft during the reversing operations. These sliding valves are connected to the reversing valve and are operated with it. With both the gas inlet flue and the stack flue closed the gas remaining in the checker work will flow into the furnace during the reversing of the valve. Another advantage claimed is that increased pressure will accumulate behind the gas flow valve, which will fill the checker chamber quickly when the valve is opened.

Canadian Basic Steel for Shells

It is stated that when the question came up of making shells in Canada from basic steel as against the acid steel preferred by British government agents, the shell committee, in co-operation with Col. Thomas Cantley, president of the Nova Scotia Steel & Coal Company, spent \$500,000 for experimental and other work in that company's plant. The result, according to a statement by Sir Samuel Hughes in the House of Commons, Ottawa, Canada, was that basic steel was just as suitable for shells as the acid steel of the United States and that Canada has turned out 800,000,000 lb. of steel for use in shell making.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.; New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast, 65c. on plates, structural shapes, iron and steel bars, pipe and boiler tubes, tin plate, nails, spikes and wire. The foregoing rates to the Pacific coast are by rail only.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car track and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, 1/4 in. thick, 6 1/4 in. up to 100 in. wide, 2.75c. to 4c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, 1/4 in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered 1/4-in. plates. Plates over 72 in. wide must be ordered 1/4 in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under 1/4 in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Rods.—Bessemer, open-hearth and chain rods, \$60, nominally.

Wire Products.—Prices to jobbers, effective Feb. 29: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.25; galvanized, \$2.95. Galvanized barb wire and staples, \$3.25; painted, \$2.55. Wire nails, \$2.40. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Woven wire fencing, 61 1/2 per cent off list for carloads, 60 1/2 off for 1000-rod lots, 59 1/2 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Nos.	0 to 9	10	11	12	12 1/2	13	14	15	16
Annealed	\$2.30	\$2.35	\$2.40	\$2.45	\$2.50	\$2.60	\$2.70	\$2.80	\$2.90
Galvanized	3.20	3.25	3.30	3.35	3.40	3.55	3.90	4.00	

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, on black and galvanized steel and iron pipe, all full weight:

Steel			Butt Weld			Iron		
Inches	Black	Galv.	Inches	Black	Galv.	Inches	Black	Galv.
1/4, 1/2 and 3/4	63	30 1/2	1/4 and 1/2	52	19			
1 1/2	67	46 1/2	3/4	53	20			
3/4 to 3	70	50 1/2	1 1/2 to 1 1/2	57	33			
				60	38			

Lap Weld			Reamed and Drifted		
2	65	45 1/2	1 1/4	48	26
2 1/2 to 6	68	48 1/2	1 1/2	54	33
7 to 12	65	44 1/2	2	55	34
13 and 14	53 1/2		2 1/2 to 4	57	37
15	51		4 1/2 to 6	57	37
			7 to 12	56	36

Butt Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
1/4, 1/2 and 3/4	59	35 1/2	1 1/4	50	28
1 1/2	64	45 1/2	1 1/2	55	34
3/4 to 1 1/2	68	49 1/2	2	57	37
2 to 3	69	50 1/2	2 1/2 to 4	59	40
			4 1/2 to 6	58	39
			7 and 8	52	33
			9 to 12	47	28

Butt Weld, double extra strong, plain ends			Lap Weld, double extra strong, plain ends		
1/4	55	38 1/2	1 1/4	44	25
3/4 to 1 1/2	58	41 1/2	1 1/2	44	25
2 to 2 1/2	60	43 1/2	2	46	30
			2 1/2 to 4	45	29
			4 1/2 to 6		

To the large jobbing trade an additional 5 per cent is allowed over the above discounts. The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipment on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8		2.85 to 2.95
Nos. 9 to 10		2.90 to 3.00
Nos. 11 and 12		2.95 to 3.05
Nos. 13 and 14		3.00 to 3.10
Nos. 15 and 16		3.10 to 3.20

Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.

Box Annealed Sheets, Cold Rolled		Cents per lb.
Nos. 17 to 21		2.65 to 2.70
Nos. 22 and 24		2.70 to 2.75
Nos. 25 and 26		2.75 to 2.80
No. 27		2.80 to 2.85
No. 28		2.85 to 2.90
No. 29		2.90 to 2.95
No. 30		3.10 to 3.15

Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.

Galvanized Sheets of Black Sheet Gage		Cents per lb.
Nos. 10 and 11		4.00 to 4.25
No. 12		4.10 to 4.35
Nos. 13 and 14		4.10 to 4.35
Nos. 15 and 16		4.20 to 4.45
Nos. 17 to 21		4.35 to 4.60
Nos. 22 and 24		4.55 to 4.80
Nos. 25 and 26		4.70 to 4.95
No. 27		4.85 to 5.10
No. 28		5.00 to 5.25
No. 29		5.15 to 5.40

Above prices are for Bessemer stock. For open-hearth stock \$2 per ton advance is charged.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes and standard charcoal-iron tubes, effective from April 15, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1 1/2 in.	35	1 1/2 in.	27
1 3/4 in.	47	1 3/4 in.	39
2 in.	44	2 in.	36
2 1/4 in.	50	2 1/4 in.	42
3 and 3 1/4 in.	55	3 and 3 1/4 in.	47
3 1/2 to 4 1/2 in.	56	3 1/2 to 4 1/2 in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1 1/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York	Lake	Tin, Electrolytic	New York	Lead		Spelter	
					New York	St. Louis	New York	St. Louis
April 19	28.75	28.50	51.00	7.62½	7.50	19.00	18.75	18.75
20	28.75	28.50	50.50	7.62½	7.50	18.75	18.50	18.50
21	28.75	28.50	....	7.60	7.50	18.75	18.50	18.50
22	28.75	28.50	....	7.60	7.50	18.75	18.50	18.50
23	28.75	28.50	49.75	7.50	7.37½	18.50	18.25	18.25
24	28.75	28.50	49.75	7.50	7.37½	18.25	18.00	18.00
25	28.75	28.50	49.75	7.50	7.37½	18.25	18.00	18.00

NEW YORK, April 26, 1916.

Copper has ceased to be active, but quotations are strong. Tin consumers are well supplied and the market is lower. Lead is extremely dull and lower. Buyers show no interest in spelter and it has dropped about 1c. Antimony has declined under freer offerings.

New York

Copper.—Buying of importance, both on domestic and foreign account, is past, and the market is quiet although prices continue very firm. That demand is absent is indicated by the appearance of resale metal. Both last week and this week prompt electrolytic has been offered at 30.50c., full terms, without arousing interest on the part of buyers. April and May electrolytic has been offered at 30c. without results. Electrolytic for delivery in August or later is available around 28.50c., cash, New York. Prompt Lake is nominal at about 31c., and third quarter at about 28.75c. It would be difficult to find second quarter Lake. The London market continues strong, electrolytic being quoted there yesterday at £140. The exports this month, including yesterday, total 18,780 tons, but this takes no account of the vast quantity of copper which is going abroad in the form of munitions.

Tin.—The uncertainty in the matter of obtaining shipping licenses in London continues the outstanding feature of the market. There is still some question as to where tin will be obtained wherewith to liquidate existing contracts, and some sellers are proceeding cautiously in entering commitments. Most consumers are well supplied and cannot be interested and, in the absence of business, quotations are lower. Last week the market was inactive except for the taking of small lots. Yesterday there was some improvement, two buyers wanting 100 tons each, and at least 200 tons was traded in. The spot quotation yesterday was 49.75c. The arrivals this month, including yesterday, total 2635 tons. There is now afloat 5014 tons.

Lead.—Not much is to be said of the lead market except that it has been dull and has shown a continuous downward tendency. Both the domestic and foreign demand is light, especially that from abroad. Sellers are looking for business, but without much success as the consumers have all they need and say that under the circumstances there is no reason why they should make bids. How quiet the market is may be inferred from the fact that for a fairly round lot of Mexican lead which recently came over the border, not over 6c., New York, in bond, was offered. The New York quotations of the leading producer and of the independents are now on the same level at 7.50c. At St. Louis, however, the independent producers are asking 7.37½c. and the leading interest, 7.42½c. Altogether the market is distinctly easy. The exports this month, including yesterday, total 1270 tons.

Antimony.—Business has been quiet to the point of dullness, and, with supplies more plentiful, the quotation for prompt Chinese and Japanese has declined to 39.50c., duty paid.

Aluminum.—Quotations for No. 1 virgin aluminum, 98 to 99 per cent pure, are somewhat easier at 58c. to 60c.

Spelter.—The market has entered on one of the periods of extreme dullness which are characteristic of spelter. The dullness is helped along by offerings of resale metal by consumers as well as speculators. In the past few days prices have dropped about 1c. per

lb., the quotations yesterday being about 18.25c., New York, and 18c., St. Louis. The slump in the metal is attributed very largely to the figures contained in the report of the United States Geological Survey, indicating a tremendous increase in prospective production. The exports this month, including yesterday, total 2111 tons. The St. Louis minimum for May delivery is about 17.37½c.; for June, about 16.75c., and for third quarter, 15.50c.

Old Metals.—The market is steady. Dealers' selling prices are continued as follows:

	Cents per lb.
Copper, heavy and crucible	27.00 to 28.00
Copper, heavy and wire	26.00 to 27.00
Copper, light and bottoms	23.00 to 24.00
Brass, heavy	16.00 to 16.50
Brass, light	13.50 to 14.00
Heavy machine composition	19.00 to 20.00
No. 1 yellow rod brass turnings	16.00 to 16.50
No. 1 red brass or composition turnings	17.00 to 18.00
Lead, heavy	6.75
Lead, tea	6.25
Zinc	14.00 to 15.00

Chicago

APRIL 24.—The abnormally high level of metal prices could not have been expected to be maintained, and the past week brought some adjustment. Copper quotations, however, are still moving upward. We quote: Casting copper, 28c. to 28.50c.; Lake copper, 29.50c. to 30c.; tin, carloads, 50c., and small lots, 52c.; lead, 7.45c. to 7.50c.; spelter, 18.375c.; sheet zinc, 25c.; Cookson's antimony, 50c.; other grades, 42c. to 43c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22c.; copper bottoms, 20c.; copper clips, 21c.; red brass, 18c.; yellow brass, 14c.; lead pipe, 6c.; zinc, 13.50c.; pewter, No. 1, 28c.; tinfoil, 38c.; block tin pipe, 44c.

St. Louis

APRIL 24.—Non-ferrous metals were slightly easier toward the end of the past week, and closed to-day as follows: Lead, 8c.; spelter, 20c.; tin, 54c.; Lake copper, 30c.; electrolytic copper, 29.50c.; antimony, 48c. In the Joplin ore district zinc blende declined about \$5 per ton, the range being from \$120 to \$95, with the top price \$125 and the average for the week's production of the district \$105. Calamine also declined about \$5, the range being from \$85 to \$70, with an average for the week's production of \$76. Lead ore was \$2.50 per ton lower, selling at \$100, basis of 80 per cent, with an average for the week of \$99. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 15.50c.; heavy copper and copper wire, 19c.; lead, 5.50c.; tea lead, 3.50c.; pewter, 24c.; tinfoil, 35c.; zinc, 10c.

Military Engineering Lectures in Pittsburgh

Five lectures on military engineering are to be given in Pittsburgh in the Carnegie Music Hall on consecutive Wednesday evenings beginning May 3. The subjects of the lectures and the speakers are as follows:

"The Organization and Duties of Engineer Troops," by Lieut.-Col. Francis R. Shunk, Corps of Engineers, U. S. A., May 3.

"Military Reconnaissance, Sketching and Surveying. Military Demolitions," by Maj. P. S. Bond, Corps of Engineers, U. S. A., May 10.

"Field Fortifications and Methods of Trench Warfare. Siege Operations," by Capt. C. L. Sturdevant, Corps of Engineers, U. S. A., May 17.

"Military Roads, Bridges, Fords and Ferries," by Maj. J. C. Oakes, Corps of Engineers, U. S. A., May 24.

"Mobilization of Material and Industrial Resources," by A. L. Humphrey, vice-president Westinghouse Air Brake Company, Pittsburgh, May 31.

The course is open to engineers and technical men. Its object is to familiarize men of engineering training or experience with the work of military engineers and to point out to them the ways in which they may best serve the country in time of need. Those planning to participate should write to Elmer K. Hiles, secretary Engineers' Society of Western Pennsylvania, Oliver Building, Pittsburgh, Pa. The personnel of the committee in charge of the lectures is substantially the same as printed in THE IRON AGE of March 23.

Iron and Industrial Stocks

NEW YORK, April 26, 1916.

The past week has been featured by a severe slump in prices of stocks, caused by our critical relations with Germany. The sharpest decline occurred on Saturday. On Monday some recovery occurred, as conditions then appeared less threatening, followed by further improvement on Tuesday. The so-called war orders stocks were hit the hardest. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com., 23 1/2 - 26 5/8	Ry. Steel Spring, com., 32 - 36 7/8
Allis-Chal., pref., 72 1/2 - 75	Ry. Steel Spring, pref., 95 5/8 - 97
Am. Can., com., 52 1/2 - 58	Republic, com., 43 1/4 - 49
Am. Can., pref., 109 - 111 1/2	Republic, pref., 107 1/4 - 108 1/4
Am. Car & Fdy., com., 55 - 63	Sloss, com., 47 - 51
Am. Car & Fdy., pref., 116 - 117	Sloss, pref., 93
Am. Loco., com., 63 1/4 - 70 3/4	Pipe, com., 16 7/8 - 20 5/8
Am. Loco., pref., 100 - 101 1/4	Pipe, pref., 50 1/4
Am. Steel Fdries., 44 - 49	U. S. Steel, com., 80 - 84
Bald. Loco., com., 84 - 92	U. S. Steel, pref., 116 - 117 1/4
Bald. Loco., pref., 108	Va. I. C. & Coke, 48
Beth. Steel, com., 417 1/2 - 439	Westg. Electric, 53 3/4 - 60 1/2
Beth. Steel, pref., 132 - 135	Am. Rad., com., 39 5/8 - 39 5/8
Case (J. I.), pref., 87 - 87 3/4	Am. Ship, com., 40 - 43 3/4
Colo. Fuel, 38 1/4 - 42 1/4	Am. Ship, pref., 88 3/4
Deere & Co., pref., 93 3/4	Chic. Pneu. Tool, 67 - 70 1/4
Gen. Electric, 159 - 165	Lake Sup. Corp., 9 - 9 3/4
Gt. No. Ore Cert, 36 3/4 - 40 3/4	Pa. Steel, pref., 98
Int. Harv. of N. J., com., 109 3/4 - 111	Warwick, 10 1/2 - 10 5/8
Int. Harv. of N. J., pref., 118 - 119	Cruc. Steel, com., 75 - 84 1/4
Int. Harv. Corp., com., 71 - 72 5/8	Cruc. Steel, pref., 112 - 115 1/4
Lacka. Steel, 65 - 72	Harb.-Walk. Refrac., com., 84
Nat. En. & Stm., com., 19 3/4 - 23	La Belle Iron, com., 51 - 53 1/4
N. Y. Air Brake, 125 - 132	La Belle Iron, pref., 128 - 128 1/4
Pitts. Steel, pref., 97 3/4 - 99	Can. Car & Fdy., com., 69 - 72
Pressed Stl., com., 43 3/4 - 48 3/4	Carbon Steel, com., 65
Pressed Stl., pref., 101	Driggs-Seabury, 137 - 142
	Midvale Steel, 57 - 60 7/8

Dividends

The International Harvester Company of New Jersey, regular quarterly, 1 1/4 per cent on the preferred stock, payable June 1.

The International Harvester Corporation, regular quarterly, 1 1/4 per cent on the preferred stock, payable June 1.

The American Brass Company, regular quarterly, 1 1/2 per cent, and an extra of 3 1/2 per cent, payable May 1.

The Penn Marine & Ordnance Castings Company, regular quarterly, \$1 per share and an extra of 25c. per share, payable May 1. This is the initial dividend declaration of the company.

The Stewart-Warner Speedometer Company, regular quarterly, 1 3/4 per cent on the preferred stock and 1 1/2 per cent on the common stock, payable May 1.

Canada Foundries & Forgings, Ltd., regular quarterly, 4 per cent and an extra of 3 per cent on the common stock and regular quarterly, 1 3/4 per cent on the preferred stock, all payable May 15.

The Cleveland-Cliffs Iron Company, regular quarterly, 2 1/4 per cent, payable April 25.

The Dominion Bridge Company, Ltd., regular quarterly, 2 per cent and an extra of 2 per cent, payable May 15.

The Dominion Steel Corporation, regular quarterly, 1 1/2 per cent on the preferred stock, payable May 1.

The Warwick Iron & Steel Company, semi-annual, 3 1/2 per cent, payable May 15.

The United States Steel Corporation, regular quarterly, 1 1/4 per cent on the preferred stock, payable May 29, and 1 1/4 per cent on the common stock, payable June 29.

The Taylor-Wharton Iron & Steel Company, regular quarterly, 1 3/4 per cent on the preferred stock, payable April 24.

The Scoville Mfg. Company, extra, 10 per cent, payable May 1. This is the largest extra monthly dividend the company has ever distributed. Last month an extra dividend of 8 per cent was paid, in addition to the regular quarterly dividend of 2 per cent.

The Evans Mold & Foundry Company, Uniontown, Pa., has purchased four acres and is having plans drawn by John Harmon for a foundry and machine shop. The present foundry is 38 x 78 ft., and the new one will be 40 x 100 ft. The present machine shop, 32 x 48 ft., will be enlarged by the new shop, which will be 35 x 100 ft., and will also contain the offices. Both buildings will be of brick and concrete, one story, and will be used for the manufacture of glass molds. David C. Evans is the proprietor.

The L. R. Meisenhelter Machinery Company, Philadelphia, Pa., has removed from the Bourse Building to more commodious quarters at the corner of Fourth and Race streets. It makes a specialty of machine shop and iron and steel works equipment and precision machinery.

Reclaiming High-Speed Steel

The odds and ends of high-speed steel collected in a given plant may be sent to the Onondaga Steel Company, Syracuse, N. Y., for forging into tool bits according to the plant's specifications and then returned to the owner of the high-speed steel for use again in his manufacturing processes. It has been estimated that 40 per cent of the high-speed steel produced is scrapped because the usual shop equipment is not suited to utilize the odd pieces, and the Onondaga company has been established to conduct a service business in converting the small pieces of steel into utilizable forms by forging and by welding to alloy steel bits and all under a system of heat treatment calculated to improve the structure of the steel and its cutting value. The company has established works at 1119 East Water Street, Syracuse. S. S. Buckley, for five years in charge of the sales of the tool steel department of the Bethlehem Steel Company and for a similar time previously with the Halcomb Steel Company in a like capacity, following a number of years in the practical as well as selling side of the tool steel business, is president. E. D. Newkirk, experienced in tool-making and formerly of the Marvin & Castler Company, Canastota, N. Y., is secretary and treasurer. Expressed briefly, the company takes bars of unusable size, bar ends, short lathe and planer tools, drill shanks, cutter shanks, broken and worn-out milling cutters, etc., and returns this steel forged and heat-treated into the forms desired by the owner of the steel. With high-speed steel at present about 22c. per ounce, and the likelihood that it will be a long time before high-speed steel will drop as low as 10c. per ounce, the company feels that it has a long period of usefulness in this one particular.

Tantalum in Tool Steels

Geo. G. Blackwell Sons & Co., Ltd., Liverpool, England, alloy manufacturers, are prepared to furnish ferrotantalum, high in tantalum and free from carbon. A circular letter from the firm states that the extremely high price and great scarcity of tungsten have caused the metallurgists of important steel works to seek for substitutes, and among these the most likely to give encouraging results would appear to be tantalum. It belongs to the tungsten family; its atomic weight is similar, as also is its melting point, and it produces steels of extraordinary hardness.

Several years ago a number of steel manufacturers experimented with tantalum, but their researches were necessarily confined to low-percentage tantalum steels because the only ferrotantalum obtainable was rather low in percentage and high in carbon, and consequently the effect of adding high percentages of tantalum made the steels much too high in carbon. For high speed tool steels the carbon is usually about 0.65 per cent. Therefore, for any experiments with high percentage tantalum tool steels, a low carbon ferrotantalum is essential, such as that produced by the firm above named.

Tungsten Supplies from Portugal

Prices of tungsten ore in Portugal advanced in 1915 from \$6.18 to \$18.25 per unit, as reported by Consul General W. L. Lowrie, of Lisbon, Portugal. At first the Portuguese Government placed an embargo on tungsten, but as the mineral is not used in any local industry, it was finally arranged that England, France and the United States receive one-third of the output. In some mines, taken over by an American company, engineers discovered molybdenite, the existence of which had not been known.

A Boston news item states that the import business in Portuguese tungsten ores of Gaston, Williams & Wigmore, New York, in the past few months has been very heavy, its Portugal department showing gross importations of \$3,000,000.

The Independent Pneumatic Tool Company's Atlanta, Ga., branch will be moved to Birmingham, Ala., on May 1. A suite of offices has been leased in the Jefferson County Bank Building.

Iron and Steel Institute's Annual Meeting

The annual meeting of the Iron and Steel Institute will be held in London on May 4 and 5. The following papers will be presented and discussed:

"Notes on the Theory of the Corrosion of Steel," by L. Atchison; "Notes on the Relations Between the Cutting Efficiencies of Tool Steels and Their Brinell or Scleroscope Hardnesses," by J. O. Arnold; "A New Thermo-Electric Method of Studying Allotropic Changes in Iron or Other Metals," by C. Benedicks; "Initial Temperature and Critical Cooling Velocities of a Chromium Steel," by C. A. Edwards; "The Influence of Carbon and Manganese Upon the Corrosion of Iron and Steel," by Sir Robert Hadfield and J. N. Friend; "Early Experiments on the Recalescence of Iron and Steel," by A. Mallock; "A Few Experiments on the Hardness Testing of Mild Steel," by W. N. Thomas; "Surface Tension Effects in the Intercrystalline Cement in Metals and the Elastic Limit," by F. C. Thompson.

The new president, Sir William Beardmore, will deliver his inaugural address and the Bessemer Gold Medal for 1916 will be presented to F. W. Harbord. The autumn meeting is announced to take place in London, Sept. 21 and 22, 1916. At this meeting the following by-laws, proposed last fall, will be voted upon for adoption:

1. In the event of a state of war existing between the United Kingdom and any other country, or state, all members, honorary members, and honorary vice-presidents who shall be subjects of such enemy country, or state, shall forthwith cease to be members, honorary members, or honorary vice-presidents of the institute, but they shall be eligible for re-election after the war in the usual manner.
2. The council shall have absolute power to remove from the list of members of the institute the name of any member, whether ordinary or honorary, for wilful contravention of the by-laws or for any other reason which seems to them sufficient, and such ordinary or honorary member shall thereupon cease to be a member of the institute.

An American Handbook for Russia

The American-Russian Chamber of Commerce, 60 Broadway, New York, of which E. C. Porter is secretary, has decided to prepare for exclusive distribution in Russia a handbook on American financial and commercial conditions, containing a directory of selected American business houses. Hitherto American business firms have been unable to establish direct contact with Russian distributors and consumers, and Russian firms have had no means of developing direct connections with American business houses. The book, which will be printed entirely in Russian, will devote a section to a concise survey of industrial and commercial conditions in this country. It will furnish general information in regard to commercial organizations, commercial laws and the details of the organization of American public utilities, railroads, mineral resources, etc., and will be of real value to the Russian business house. The publication has the official approval of the Russian Government and will be distributed by the Russian-American Chamber of Commerce in Moscow and its branch in Petrograd.

The Chain Belt Company and the Sivyer Steel Casting Company, Milwaukee, Wis., have surprised their employees by giving them life insurance policies which have been placed on the group plan. The policies are taken out in the Equitable Life Assurance Society, and cover 300 workmen at the Chain Belt plant and 150 in the Sivyer foundry. Employees who have been with the companies more than six months and less than a year receive a \$500 policy; between one year and two years, \$750; more than two years, \$1,000. The premiums are paid by the companies monthly.

The Standard Screw Products Company has just purchased the entire block adjoining its present plant at Bellevue and Warren avenues, Detroit, Mich. It is planned to erect a number of modern factory buildings on this site. The company has contracts covering its production for the next 12 to 14 months and has sufficient material on hand to cover its requirements. A cash dividend of 50 per cent, in addition to the regular monthly dividend of 1 per cent, was recently paid.

Pittsburgh and Nearby Districts

The South Side Trust Company and David N. Carlin have been appointed temporary receivers for the Thomas Carlin's Sons Company, Pittsburgh, builder of rolling mill machinery and other equipment. Application for the receivership was filed by Harriet A. Carlin, executrix of the estate of William J. Carlin, deceased.

H. R. Sterrett, for some years with the Standard Scale & Supply Company, Pittsburgh, has been appointed representative in that city of the Pittsburgh Pneumatic Company, Canton, Ohio, manufacturer of riveting, chipping and sand ramming machinery, and has opened offices in room 202 Keystone Building, Pittsburgh.

The American Steel Foundries will add another furnace to its open-hearth steel plant at Sharon, Pa., making four in all. The small ingots made in this plant are being shipped in considerable quantity to Montreal, Canada, where they are machined and made into shells.

The Alice mine of the Pittsburgh Coal Company at Roscoe, Pa., has been sold to the H. C. Frick Coke Company. The Pittsburgh Coal Company is to work the mine this year and ship the output according to the direction of the Frick Company.

The Pittsburgh-Des Moines Company, a corporation organized under the laws of Pennsylvania, has leased the Neville Island plant, purchased all accounts and assumed all liabilities of the Pittsburgh branch of the Des Moines Bridge & Iron Works. The officers and directors are the same as those of the Des Moines Bridge & Iron Works, and the business will be conducted as heretofore.

The Pennsylvania Engineering Works, New Castle, Pa., blast furnace and steel plant construction, general machine work, etc., is making an addition 180 ft to the end of its foundry, consisting of a runway 60 ft. wide and a leanto runway about 40 ft. wide. No new equipment will be purchased. The company is very busy, having orders booked for its products for some months to come.

A pig casting machine is to be added to one of the Hubbard furnaces of the Andrews & Hitchcock Iron Company, Youngstown, Ohio, recently purchased by the Youngstown Sheet & Tube Company.

Stockholders of the American Spiral Spring Company, Pittsburgh, have re-elected directors as follows: John Pfeil, L. L. Wolfe, William McConway, Jr., J. B. Thomas and Robert E. L. Bailey.

The open-hearth steel capacity of the Brier Hill Steel Company, Youngstown, Ohio, will be increased about 400 tons per day within a short time, as open-hearth furnaces Nos. 9 and 10, which have been under erection for some time, will soon be completed. No. 9 will be ready within a week and the other a short time later. These furnaces are of 100 tons capacity per heat. No. 8 furnace, of the same size, was started some time ago.

The Carnegie Steel Company, which will build steel bar, hoop and band mills at McDonald, near Girard, Ohio, where it owned 113 acres of ground, has recently acquired 408 acres more. It is the intention of the company to found a town at McDonald and build homes for employees. No definite plans have yet been made, but lots will be sold to the employees at a low price and they will be assisted in building homes.

The Safety Commission of the Illinois Manufacturers' Association met at dinner on Wednesday of this week at Chicago, following which the evening's program included an address on "Fellowship" by Clarence H. Howard, president Commonwealth Steel Company, and a discussion of the "Ford Plan" by Prof. S. S. Marquis, Ford Motor Company.

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has opened a branch sales office at 416 Citizens' Building, Cleveland, Ohio, in charge of Charles E. Newell.

Iroquois Iron Company Gives Option

Interests associated with the By-Products Coke Corporation, Chicago, operating Solvay coke ovens and the two blast furnaces recently taken over from the Federal Furnace Company at South Chicago, have taken an option on a majority of the stock of the Iroquois Iron Company at a price announced to be \$80 a share, the option running to July 1.

The principal stockholding interest in this company, aside from M. Cochrane Armour and others at Chicago, is that of Rogers, Brown & Co., and the possible exercising of this option will release that company from an operating interest, as was the case in the transfer of its Cleveland Furnace Company holdings several months ago.

The Iroquois Iron Company has already disposed of its ore properties on the Cuyuna range, the Inland Steel Company having taken them over about a year ago. Its furnace plant now consists of four stacks, two of them of recent erection, a third recently remodeled and enlarged, and the fourth under lease for the manufacture of ferromanganese, the four having an aggregate capacity of about 1400 tons of pig iron daily. In the last several months an excellent record, both in production and earnings, has been made.

The By-Product Coke Corporation is located very advantageously with respect to both of the South Chicago furnace plants, the transfer of coke by barge from ovens to furnace having for some time been one of the economical features of operation. Under the arrangement suggested by the option, the iron-ore resources of Pickands, Mather & Co. and the sales connections of Pickands, Brown & Co. will be available. Rogers, Brown & Co. represent a number of other furnaces than the Iroquois in the sale of pig iron at Chicago, and upon this activity the option will have no bearing.

Steam Pump Company Reorganized

The Worthington Pump & Machinery Corporation, recently organized under the laws of Virginia, was on Tuesday declared the successor in ownership of the properties of the defunct International Steam Pump Company, the plan of the joint reorganization committee having become effective.

The new company has acquired direct ownership of the properties owned by the International and its subsidiaries, with the exception of Henry R. Worthington, of which it owns practically all of the common and more than 95 per cent of the preferred. Its only outstanding liens are \$200,000 5 per cent bonds of the Jeanesville Iron Works and \$423,400 5 per cent bonds of the Holly Mfg. Company. It will start business with \$3,093,000 cash.

All of the company's stock has been placed under a voting trust, to continue for five years from April 1, 1916. The voting trustees are Lewis L. Clarke, George G. Henry, Percy Jackson, R. Walter Leigh, and Charles H. Sabin.

Thomas Auto Truck Company, Incorporated

The Thomas Auto Truck Company, Inc., has been incorporated to manufacture Thomas auto trucks of $\frac{3}{4}$, 1, 1½ and 2 tons capacity and also taxicabs. C. K. Thomas, identified with the motor truck industry for over 13 years and for three years prior to 1916 vice-president and general manager of the Federal Motor Truck Company, New York, is president and founder of the company. Cloyd Marshall, formerly with the C. W. Hunt Company, is secretary and treasurer. The directors include William S. Thomas, formerly identified with J. M. Guffey & Co., Pittsburgh; O. S. Platt, Platt Pattern & Machine Works, Bridgeport, Conn.; Philip F. Donohue, who is identified with the advertising business, and George E. Whitney, automobile engineer, Bridgeport, Conn., and formerly chief engineer

of the Locomobile Company of America. M. D. Herron, formerly sales manager of the Federal Motor Truck Company, is sales manager of the new company, and Walter Jones is chief engineer and superintendent. The factory and offices are located at 639-641 West Fifty-first Street, New York City. The trucks and taxicabs are constructed of standard units furnished by companies specializing in different parts.

General Chemical Buys Pulaski Foundry

The Pulaski Foundry & Machine Company's plant at Pulaski, Va., has been purchased by the General Chemical Company of New York, which will use it to make castings and machinery for the 25 plants it now has in operation. If this new department proves a profitable one, the General Chemical Company will erect a much larger foundry about one-quarter of a mile away, adjoining its Pulaski chemical plant and will do away with the one it has just acquired.

In consequence of the deal, certain stockholders of the Pulaski Foundry & Machine Company have organized a new company under the same name, and will build a plant on a 5½-acre site bought from the Bertha Mineral Company. Robert Bunts, Jr., is president and treasurer of the new company, and O. C. Brewer is vice-president and secretary. The minimum capital stock is to be \$25,000 and the maximum \$50,000. Plans are in preparation by Frank Stone for a foundry, 40 x 130 ft., and a machine shop of the same size. Machinery will be purchased immediately, so that the new company will have its plant ready for operation by the time it relinquishes the present one, which is Sept. 24.

The New Timken Steel Plant

The Timken Roller Bearing Company, Canton, Ohio, will shortly begin the erection of a steel plant for the manufacture of electric steel to supply its tubing mill and for other manufacturing uses in its own plant and that of the Timken-Detroit Axle Company, Detroit, Mich. This company at present depends on other mills for its supply of electric steel bars. The new plant will include two six-ton Heroult electric furnaces, a blooming and bar mill and a large press for breaking down blooms. The contract for the mill equipment has been placed with the Standard Engineering Company, Ellwood, Pa. The steel plant will occupy a building 100 x 390 ft. and a wing 100 x 266 ft. Its erection will be commenced as soon as possible.

The Industrial Arts Index, which is published in February, April, June, October and December of each year by the H. W. Wilson Company, White Plains, N. Y., is an accumulative index to trade and engineering journals. In it are now indexed regularly the contents of 80 journals devoted to engineering and various industries. From the same office is issued an annual. That for 1915, which is now ready, contains 509 double column pages. The articles indexed cover a wide range of literature in the arts and sciences.

The Bucyrus Company, South Milwaukee, Wis., has received word from the Panama Canal that a world's record for one day's dredging work was recently established in the Culebra cut by the Cascadas dredge, one of the large machines furnished by the company. This dredge was delivered in Colon in October, 1915, and immediately established a record cut of 23,000 cu. yd. in one day. A short time ago the dredge broke its own record, cutting 23,305 cu. yd. in a little less than 24 hr. This figures about 25 tons a minute.

The Inland Steel Company, Chicago, is credited with the unusual performance of running its complement of 12 open-hearth furnaces continuously, through the month of March. With this large production of steel it was possible to operate its plate mill double turn, enabling the company greatly to improve its position in that department of the plant.

PERSONAL

H. L. Williams, president of Hickman, Williams & Co., Chicago, has returned to his office in greatly improved health, after a two months' sojourn in the Southwest.

Clifford J. Ellis, who has for many years been sales manager for the Cambria Steel Company at Chicago, has been appointed sales manager for the Midvale Steel Company, in charge of sales in that territory for the Midvale Steel Company, Cambria Steel Company and Worth Brothers Company in their combined relations.

W. T. Hughes, vice-president American Stamping & Enameling Company, and former assistant general manager of the company's plants at Bellaire, Ohio, has been appointed general manager of its new plant at Massillon, Ohio, succeeding Maurice R. Bissell, resigned.

Charles W. Cullen, president Charles W. Cullen Machinery Company, Cincinnati, Ohio, announces the removal of the company's offices from the Pickering Building to 1307 First National Bank Building. He is a brother of James K. Cullen, president Niles-Bement-Pond Company, and of E. S. Cullen, president E. S. Cullen Machinery Company, Cleveland.

H. C. Hale and Walter G. Stephan, Cleveland, Ohio, have formed a corporation known as the Hale-Stephan Company, with offices at room 500 Schofield Building. Mr. Hale will continue to represent the Ridgeway Dynamo & Engineering Company, and Mr. Stephan the American Engineering Company, Philadelphia, maker of Taylor stokers; the Vulcan Soot Cleaner Company, Dubois, Pa., and the Engineering Company, New York.

Walter Mickelson, chief draftsman of the Kearney & Trecker Company, West Allis, Milwaukee, Wis., has resigned to become associated, May 1, with the Cleveland Milling Machine Company, as chief engineer.

Edward King, for many years president and treasurer of the Pennsylvania Engineering Works, New Castle, Pa., has resigned because of ill health. He has been succeeded by E. W. Beadel, formerly vice-president and general manager. C. L. Baldwin, who has been secretary and purchasing agent for some years, has been made secretary and treasurer. W. H. Shieler is superintendent and J. K. Furst, chief engineer.

James A. Campbell, president of the Chamber of Commerce of Youngstown for the past year, has notified that body that he will not be a candidate for re-election, as his time is so fully taken up with his business interests. Mr. Campbell is president and director of the Youngstown Sheet & Tube Company; a director of the Lackawanna Steel Company, Erie Railroad, First National Bank and Dollar Savings & Trust Company of Youngstown, Youngstown Ice Company and Central Store Company; president of the Andrews & Hitchcock Iron Company, and is actively connected with other large manufacturing interests.

A. E. Borie, president Driggs-Seabury Ordnance Company, Sharon, Pa., has been elected a director of the Finance & Trading Corporation, New York City, organized to transact a general liquidating business of assets of receiverships and other administrations.

R. W. Hawkins, formerly with the H. Channon Company, Chicago, has organized the firm of Hawkins & Co., 79 West Monroe Street, Chicago, Ill., to engage in a machinery and mill supply business.

Frank S. Reitzel, at present comptroller of the Pennsylvania Steel Company, has been elected comptroller of the American Iron & Steel Mfg. Company, Lebanon, Pa. He will assume his new duties about June 1.

A paper recounting the history of the American Iron & Steel Mfg. Company, Lebanon, Pa., was read before the Lebanon County Historical Society, April 19, by Capt. H. M. M. Richards, treasurer of the com-

pany. The company was organized for the manufacture of nuts and bolts, in which industry it was a pioneer, and now has large rolling mills, 4 50-ton open-hearth steel furnaces and two 20-ton electric furnaces for refining purposes, employing 4000 men at Reading and 3000 at Lebanon, with a payroll of \$2,500,000 yearly. The annual capacity of the company's works is 160,000 tons, exclusive of the steel plant, and the annual sales run between \$6,000,000 and \$7,500,000.

A. B. Todd, of the machine-tool department of the Eccles & Smith Company, San Francisco, is visiting tool manufacturers in the East.

O. G. Smith, formerly connected with the Platt Iron Works Company, Dayton, Ohio, has been appointed district manager for the National Transit Pump & Machine Company, in charge of its new branch offices in the Marquette Building, Chicago.

T. Rice Davis has sold out his interest in the Vermilion Malleable Iron Company, Hoopeston, Ill., and has resigned as treasurer and general manager. C. L. Liebau, heretofore secretary of the company, has been appointed in addition acting general manager.

Charles E. Carpenter, manager of the Allied Machinery Company of America, who has been in Europe for several months, returned to New York April 20.

Samuel McRoberts, vice-president of the National City Bank, also president of the Allied Machinery Company of America, sailed April 22 for Petrograd, Russia, on business connected with the bank.

Thomas D. Rodgers, formerly metallurgist with the United Engineering & Foundry Company, Vandegrift, Pa., has taken a similar position with the Philadelphia Roll & Machine Company, Philadelphia, Pa.

B. A. Clements, in charge of railroad sales for the Worth Brothers Company at Chicago, has resigned to become vice-president of the Rome Merchant Iron Mills, Rome, N. Y., with offices at 30 Church Street, New York.

Vernon Job, 61 Fremont Street, San Francisco, Cal., manager of the Western office of the Independent Pneumatic Tool Company, is rapidly recovering from a severe case of appendicitis.

OBITUARY

T. KIRK PARRISH, Richmond, Va., died April 10 in a local hospital after an illness of several months, aged 55 years. He was born in Lynchburg, Va., but had been actively identified with the business and social life of Richmond for many years. He was graduated from the University of Virginia and immediately afterward became connected with manufacturing interests. At the time of his death he was an officer of the Richmond Foundry & Mfg. Company and also held responsible positions with other manufacturing concerns. He leaves his widow, two sons and two daughters.

JOSEPH A. SEDGWICK, treasurer, secretary and a director of the Fore River Shipbuilding Corporation, Quincy, Mass., died April 14.

EDWIN W. DEANE, secretary J. W. Buckley Rubber Company, died April 17 at his home in Brooklyn, N. Y.

Exports of Indian Manganese Ore

Indian manganese ore exports in January, 1916, are given by the *London Iron and Coal Trades Review* as 29,724 gross tons. Of this the United States received 1899 tons, France 2750 tons and United Kingdom 25,075 tons. The exports in January, 1915, were 26,956 tons.

The city council of St. John, New Brunswick, has put a daylight saving law in operation from midnight, April 30, until the same hour on Sept. 30, St. John being the first city in maritime Canada to adopt daylight saving.

STRIKES AND WAGE ADVANCES

The Molders' Strike at Pittsburgh

The foundrymen in the Pittsburgh district who have steadily refused to grant their molders an 8-hr. day, a strike having been on since November, 1915, are making progress in filling up their foundries with molders, and expect within a reasonable time to have enough men to operate full. The report has gone out that Pittsburgh foundrymen were granting the 8-hr. day. In order to correct this false impression, an agreement has been made by the Pittsburgh foundrymen that they will stand out for the 9-hr. day, and under no circumstances will they grant their molders an 8-hr. day. The companies that have subscribed to this agreement and say they will strictly observe it are the following:

Baird Machinery Company
J. M. Beatty Company
Braddock Machine Company
Brown & Zortman Machinery Company
Chaplin Fulton Company
Crescent Electric & Mfg. Company
Damascus Bronze Company
H. L. Dixon Company
Duff Mfg. Company
Duquesne Steel Foundry Company
W. J. Early & Sons, Ltd.
Eclipse Pattern Company
Enterprise Foundry Company
Etna Foundry Company
Fawcett Machine Company
J. G. Fitzpatrick Mfg. Company
Fort Pitt Malleable Iron Company
Fort Pitt Steel Castings Company
A. Garrison Foundry Company
H. P. Gazzam Mfg. Company
Gem Mfg. Company
Graham Nut Company
Hall Steam Pump Company
Hemmerle Company
Heppenstall Forge & Knife Company
Herman Pneumatic Machine Company
Homestead Valve Mfg. Company
N. Kelly & Son
Keystone Bronze Company
Lathwood Foundry Company
Lawrenceville Bronze Company
Lewis Foundry & Machine Company
Mackintosh Hemphill Company
Marshall Bros.
Marshall Foundry Company
Mesta Machine Company
Miller Saw Trimmer Company
J. & J. B. Milholland Company
Murphy Foundry Company
McKenna Bros. Brass Company

Jas. McNeil & Bro.
M. Vay Walker Company
National Gear Wheel Foundry
R. D. Nuttall Company
Pennsylvania Casting & Machine Company
Phillips McLaren Company
Pittsburgh Gage & Supply Company
Pittsburgh Pattern Company
Pittsburgh Reinforced Brass & Machine Company
Pittsburgh White Metal Company
Pittsburgh Brass Mfg. Company
Pittsburgh Foundry & Machine Company
Pittsburgh Iron & Steel Foundries
Pittsburgh Malleable Iron Company
H. K. Porter Company
Pittsburgh Meter Company
Reliance Pattern Works
Reliance Steel Castings Company
Rosedale Foundry & Machine Company
Ruud Water Heater Company
Sharpsburg Foundry Company
Simonds Mfg. Company
Standard Pattern Company
Sterritt-Thomas Foundry Company
Stimple & Ward
Taylor-Wilson Mfg. Company
Wayne Brass Foundry Company
Williams Gauge Company
Wilson Snyder Mfg. Company
United Engineering & Foundry Company
Union Steel Castings Company
Union Switch & Signal Company
Westinghouse Electric & Mfg. Company
Westinghouse Machine Company
Westinghouse Air Brake Company

Strike Troubles Near New York

About 1400 employees of the Harrison, N. J., plant of the International Steam Pump Works are on strike, demanding an 8-hr. day and a 10 per cent increase in wages. The company has offered a 51-hr. week with 54-hr. pay, overtime to be paid for at the rate of time and a half for all time over 51 hr. As an alternative proposition the company offered to maintain the 54-hr. week, which has been in force, and grant a flat increase of 10 per cent. Both of these offers have been rejected by the men and the plant is at a standstill. As usually is the case, a number of the employees were not dissatisfied and would gladly return to work were it not for the restraint upon them.

A particularly vicious strike has been in progress since April 13 at the plant of the National Conduit & Cable Company, Hastings-on-Hudson, N. Y. It affected one department after another, until 1700 workers are idle, about 400 of whom cannot work because of the stoppage of departments on which they are dependent. A large percentage of the strikers are foreigners, and their resentment against the company and those who would continue at work took the form of stone-throwing and the discharge of firearms. They became so unruly that four companies of the New York National

Guard were called out April 19 by the sheriff to handle the situation, as the small police force of the village was totally inadequate. The demands of the strikers include a 50-hr. week instead of one of 54 hr., and a wage increase of 20 per cent. The company has expressed its willingness to advance wages, but declines to shorten the day.

Strike at Westinghouse Electric Plant

Last week 10,000 to 12,000 machinists and other employees in the works of the Westinghouse Electric & Mfg. Company at East Pittsburgh, Pa., went on strike. The men are said to have a long list of alleged grievances and have been trying to organize a labor union. An official statement of the company has been issued by M. C. Turpin, of the publicity department, in part as follows:

Only a few weeks ago, April 1, in fact, an increase of 10 per cent was granted to all shop employees, and it was felt that this act on the part of the management would be fully appreciated.

It is obvious that the strike is for an 8-hr. day, but so far the strikers have presented to the management no statement of their grievance nor has the grievance committee under consideration at present any such question of this kind.

The grievance committee is composed of six representatives of the shop employees and a similar number representing the management for the purpose of considering all difficulties or disagreements that may arise in connection with working conditions. It was for the purpose of affording a common meeting ground for management and employees and for the consideration of just such questions as the 8-hr. day. However, the employees who walked out seem to have ignored the committee altogether.

At this writing it is said close to 15,000 men are striking. So far there has not been much disorder, but saloons in the boroughs of East Pittsburgh, Pitcairn, Wilmerding and Westinghouse have been ordered closed while the trouble exists. On Tuesday, April 25, conferences were held between some of the leaders of the men and officials of the company, but no agreement was reached. The men are said to demand shorter hours of labor, an increase in pay and concessions in regard to forming labor unions.

Highest Eastern Wage Rate

Both the Lukens Iron & Steel Company and the Worth Brothers Company of Coatesville, Pa., have announced an increase in wages to their men to go into effect May 1. Common laborers will be advanced from 17½c. an hour, which itself represents a raise a few months ago, to 20c. an hour. This is said to be the highest rate of wages ever paid to laborers by mills in the East. The pay of all other employees of the plants, including the tonnage men, will also be advanced, but how much has not yet been stated. The increase will affect between 3200 and 3400 men employed in the Worth plant and almost as large a number at the Lukens plant.

Pittsburgh and Valley Districts

Practically all the merchant blast furnaces in the Mahoning and Shenango Valleys have posted notices of a 10 per cent advance on all classes of blast furnace labor, effective May 1. This puts common labor at \$2.42 per day of 10 hr. In the Pittsburgh district there has been a general advance in wages of 10 per cent by practically all the steel companies, also to take effect May 1, and on all kinds of labor except salaried employees.

The Hussey-Binns Shovel Company, Pittsburgh, works at Charleroi, Pa., has made a general advance in wages ranging from 5 to 10 per cent, according to the class of work, effective from May 1.

Last week a committee from the Machinists' Union visited the machine shops in Youngstown, Ohio, and submitted a demand for an 8-hr. day, 50c. an hour for minimum wage rate, and closed shops, to become effective May 1. The William Tod Company has been

operating its machine shops on the 8-hr. day since last fall.

The Youngstown Iron & Steel Company, Youngstown, Ohio, has notified its employees of an advance in wages of 10 per cent, to take effect May 1, except those working under the Amalgamated Association scale, which includes its sheet mill hands. The company gives employment to about 2000 men.

Under the new schedules of wages effective at the various steel plants in the Youngstown district, common labor, commencing with May 1, will be paid at the rate of \$2.42 per day of 10 hr., which is much the highest rate ever paid for such labor in the district.

The Sharon Steel Hoop Company, Sharon, Pa., has announced a general advance in wages of 10 per cent, effective May 1.

The Knox Pressed & Welded Steel Company, Pittsburgh, works at Wheatland, Pa., near Sharon, has given its men a general advance in wages of 10 per cent.

The Cambria Steel Company, Johnstown, Pa., has announced an increase in wages of common labor of 10 per cent and on skilled labor of a larger amount, depending on present earnings of the men.

The National Forge & Tool Company, Erie, Pa., has bought the plant of the Irvine Steel Forge Co., Irvington, Pa.

The Chicago and Milwaukee Labor Situation

Machine shop and foundry operators at Chicago and Milwaukee are awaiting with keen apprehension the developments that May 1 may bring with respect to labor. The natural shortage of workmen already existing in some districts is even now curtailing production. The foundry output of the Milwaukee district has been suffering for some weeks. Special effort is being made in enabling the men now employed to increase their daily production with the primary object of insuring to them a daily wage too attractive to be lightly discontinued. Efforts are also being made in the direction of putting a premium on continuous employment. Labor organizations are undoubtedly gathering their forces to take advantage of the opportune time for forcing the union issue upon non-union and open shops.

At eight machine shops at Syracuse, N. Y., strikes were ordered by the union about ten days ago, the demands being for an 8-hr. day with no reduction in pay and the closed shop. Nearly 60 per cent of the automobile gears produced in the country come from Syracuse. At some of the shops it is stated that a number of strikers have returned to work. Men from other cities have been brought in and there is part operation of certain shops. At the Brown-Lipe-Chapin Company's works, 737 strikers appeared on Saturday to draw their pay. The Brown-Lipe Gear Company's plant is also affected by the strike as well as those of the Lipe Machine Company and the LeFevre Arms Company.

The Willys-Overland Company, Toledo, Ohio, will place a new wage scale in effect June 1. The plant will be operated on an 8-hr. day basis, employees receiving 50-hr. pay for 48-hr. work. In addition, employees now receiving 25c. or less per hour will receive an increase of 10 per cent; those now receiving between 25 and 30c. per hour will get a 10 per cent increase and those now receiving over 30c. per hour will be given a 4 per cent increase.

The Scullin Steel Company, St. Louis, has announced voluntary increases in wages which represent an average of about 12½ per cent. The increases to individuals range from 5 to 30 per cent.

The Sheldon Axle & Spring Company, Wilkes-Barre, Pa., has granted its 1700 employees a 9-hour day and time and a half for Sundays and holidays.

The Jeansville Iron Works of the International Steam Pump Company has granted about 1000 employees payment by the piece system.

National Supply and Machinery Dealers' Convention

An interesting program has been arranged for the eleventh annual convention of the National Supply and Machinery Dealers' Association, which will be held at the William Penn Hotel, Pittsburgh, Pa., on Wednesday, Thursday and Friday, May 10, 11 and 12.

The Wednesday morning session, which opens at 10 o'clock, will be a joint session of the Southern Supply and Machinery Dealers' Association, the National Supply and Machinery Dealers' Association and the American Supply and Machinery Manufacturers' Association. Addresses of welcome will be made by Col. H. P. Bope, of the Carnegie Steel Company; Robert Garland, of the Garland Nut & Rivet Company, and Frank J. Lanahan, director of the Pittsburgh Chamber of Commerce. Responses will be made by J. G. Belding, H. W. Strong and Farnham Yardley in behalf of the three associations. An address will follow by R. Goodwin Rhett, president of the Chamber of Commerce of the United States. The Wednesday afternoon session will be opened by the address of the president, H. W. Strong, Strong, Carlisle & Hammond Company, Cleveland, Ohio. This will be followed by the report of the secretary-treasurer, Thomas A. Fernley, and the report of the Program Committee, of which the chairman is W. T. Todd, Somers, Fitler & Todd Company, Pittsburgh. A discussion on "Methods of Pricing Supplies" will be led by Charles Bond, Charles Bond Company, Philadelphia, and one on "Profit Getting," by H. G. Mitchell, Harron, Rickard & McCone, San Francisco. The nominating committee will make its announcement, after which the question box will be opened.

Thursday morning will be given over to discussions as follows: "Cost of Doing Business," E. E. Strong, Strong, Carlisle & Hammond Company, Cleveland, Ohio; "What Is the Minimum Net Profit Which Should Be Realized by a Mill Supply Dealer?" R. F. Blair, Pittsburgh Gage & Supply Company, Pittsburgh; "Cooperation Between Manufacturer and Dealer in the Introduction of New Goods," N. A. Gladding, E. C. Atkins & Co., Indianapolis, Ind; "In What Specific Connections May the Ethics of the Supply Business Be Improved?" J. D. Nicklis, Manning, Maxwell & Moore, New York City; "Returned Goods—Is a Charge of 10 Per Cent Possible?" H. H. Rudd, George Worthington Company, Cleveland, Ohio.

A joint business session will be held Thursday afternoon, and members are requested to submit topics for discussion.

Friday morning will be largely devoted to discussions as follows: "What Is the Average Percentage of Cost of Traveling Salesmen, Including Salary and Expenses?" W. E. Frick, Frick & Lindsay Company, Pittsburgh; "Where Should Selling Prices Be Made and Regulated—at the Office by the Sales Manager or on the Road by the Salesmen?" W. B. Yost, Stambaugh-Thompson Company, Youngstown, Ohio; "What Advantages and Disadvantages Are There to the Supply Dealer in the Practice of Direct Shipments from Factory to Customer, and What Items of Expense Are Saved Where Direct Shipments Are Made?" E. B. Hunn, C. S. Mersick & Co., New Haven, Conn.; "Should the United States Standard Thread Be Adopted in Screw Threading Tools as a Standard to Avoid Necessity of Carrying Duplicate Stock of United States Standard and V Thread?" George Vonnegut, Vonnegut Hardware Company, Indianapolis; "What Methods Can Best Be Followed for Increasing the Amount of Mail Order and House Business?" The report of the nominating committee will be presented and the election of officers will follow.

A fine entertainment program has been prepared for those in attendance and their ladies.

The Willamette Iron & Steel Works and the Northwest Steel Works, Portland, Ore., have been awarded a contract by Hannevig & Johnson, New York, for the construction of two modern tramp steamers, each of 8800 tons dead weight. The latter company will turn out the hulls, and the machinery construction and installation will be handled by the former company.

Machinery Markets and News of the Works

DEMAND QUIETER BUT GOOD

Strikes Are a Menace to Prosperity

Freight Conditions Have Improved—Canadian Manufacturers Are Working at Full Pressure, but Labor Is Growing Problem

The railroad freight situation is easier and manufacturers are less hampered by inability to get raw materials or move their products. New England has been relieved to a considerable extent, although Waterbury, Torrington and Hartford are still under embargo. More serious than the freight congestion is the number of strikes which are being declared throughout the East. Plants are idle in Connecticut, Massachusetts, New York, New Jersey, Pennsylvania and Ohio, and it is feared that with the approach of May 1 more trouble will be encountered.

It is expected that the meetings of the National Metal Trades Association and the National Machine Tool Builders' Association, both of which are to be held in New York this week, the latter on April 29, will be of unusual interest in view of the uneasiness on the part of labor.

The machine tool trade is quieter when considered as a whole, although there is a steady stream of buying where the purchasers take one or a few tools. Builders of standard tools are busy, of course, in completing the orders on their books. Interesting items continue to come from the principal cities and only the unjust attitude of labor seems to mar the outlook.

In New York some large lots of machine tools have been taken, and some pleasing sales have been made to Cuba and South America.

It is reported that the Canadian Car & Foundry Company will make further additions to its already large plant at Kingsland, N. J.

The James Stewart Company, Inc., New York is now erecting the last of fifteen large buildings comprising the new plant of the Remington Arms & Ammunition Company, Ilion, N. Y. The new buildings will comprise 400,000 sq. ft. of floor space and are to be completed in August.

In Cincinnati the auto truck and automobile manufacturers continue the larger buyers and are compensating for the falling off in export demand, while there has been some activity on the part of munitions makers.

The tool market has been only moderately active in Cleveland, although some promising business is in prospect in Dayton. Builders of turret lathes are beginning to catch up on deliveries.

Plant additions show no diminution in New England. The Winchester Repeating Arms Company continues to enlarge. The Worcester Lathe Company, Worcester, Mass., has taken additional floor space, doubling its capacity.

In Philadelphia the Clark Can Company plans extensions which will require additional machinery and considerably increase its working force.

The Smith Wheel Company has been incorporated in Syracuse, N. Y., to manufacture auto truck wheels. The plant of the Syracuse Malleable Iron Works has been substantially increased to do this work, as well as to increase its own output.

In the San Francisco, Cal., territory the demand for tools and machinery is broadening. The Union Iron Works has placed further orders for tools, and is taking bids for the construction of a new drydock.

All kinds of manufacturing plants are working to full capacity in Canada, and many are increasing their facilities. The problem of labor is becoming more and more serious, however, and is curbing some extension work. The Imperial Shells Committee is receiving new orders almost weekly and these are being placed with such companies as can execute them in the shortest possible time.

It is understood that the Nova Scotia Steel & Coal Company, Ltd., which was recently authorized to increase its capital stock, will soon embark in the business of building steel ships.

New York

NEW YORK, April 19, 1916.

A certain amount of irregularity in demand is apparent, although viewed in its entirety the week has been a brisk one. One leading firm which found business slackening two or three weeks ago has received some excellent orders in the past few days, although there have been but few large orders distributed.

One house has received two orders which it regards with particular satisfaction. Each called for five or six tools, one lot to be shipped to Cuba and the other South America, and it is hoped that the orders indicate an awakening of demand in these directions. Shipments can be made to both Cuba and South America easier than to Europe, and the business is regarded as nearer home. The European trade continues hampered more than ever by the scarcity of ocean freight space.

The crane business is good. The Russian Purchasing Commission has placed an order for considerable crane equipment, although the cranes are to be constructed in Russia. The Sun Company, Finance Building, Philadelphia, which was in the market for structural material for a shipyard at Chester, Pa., a few weeks ago, contemplates the purchase of a large quantity of general equipment, including cranes to the value of about \$200,000.

The Ludlum Steel & Spring Company, Watervliet, N. Y., is extending its plant and will require additional equipment. Thornton W. Price, Woolworth Building, New York, is the company's consulting engineer.

Among the few large orders placed in the week was one by the General Railway Signal Company, Rochester, N. Y. A fairly large purchase was made also by the General Electric Company, Schenectady, N. Y.

With the approach of May 1 apprehension grows as to the probability of strikes in this section. A large number of machinists are out at the plant of the National Conduit & Cable Company, Hastings-on-Hudson, N. Y., and also at the plant of the International Steam Pump Works, Harrison, N. J. At the latter plant the completion of a number of engine lathes which were being built under order has been delayed. They are nearly finished.

The Ford Motor Company, Detroit, Mich., has bought 80 acres in Kearney, N. J., at the head of Newark Bay, on the property of the Newark Factory Sites, Inc. It fronts about 2300 ft. on Lincoln Highway, formerly the Plank Road, and 1900 ft. on the Passaic River. It will be the site for factories for making and assembling the new Ford tractor, and headquarters for the export business of the Ford companies. The first unit of the plant, plans for which are understood to have been drawn, will cost approximately \$1,000,000, and four other units of the same size are to follow. When completed the establishment will employ about 5000 persons. Extensive

water and railroad shipping facilities will be provided. The negotiations, which have continued some months, were conducted for the Ford interests by Gaston Plantiff, manager of the Eastern branch, and F. L. Klingensmith, vice-president and treasurer of the Ford Motor Company, and W. Benton Crisp and Theodore M. Crisp of Crisp, Randall & Crisp, attorneys. The Newark Factory Sites was represented by the banking house of Harvey Fisk & Sons and by Joseph P. Day.

It is reported that the Canadian Car & Foundry Company will erect additional buildings at its plant at Kingsland, N. J. A brass foundry and eight other buildings, it is stated, are now in the course of erection. The largest will be 400 ft. long. The present working force is 600 and it is estimated it will be increased to about 1000.

The Standard Gas Power Company, 17 Battery Place, New York, manufacturer of gas producers, has leased its plant near Twelfth Street on Monmouth Street, Jersey City, N. J., to the Sanitation Corporation controlled by the T. A. Gillespie Company, 50 Church Street, New York. The plant consists of a reinforced concrete factory and several smaller buildings, having about 40,000 sq. ft. of floorspace on a plot 160 x 200 ft. over-all. The lease is for three years with option to purchase. The Standard Gas Power Company has a working arrangement whereby the lessee will manufacture its producers.

The Place's Liquid Air Company, 971 Bloomfield Avenue, Glen Ridge, N. J., has been incorporated with a capital stock of \$30,000 to manufacture liquid air, liquid oxygen and other liquified gases by the fractional condensation and distillation of air. Julius C. Gadsden is president, Clarence Place is secretary and James F. Place is treasurer and consulting engineer. It is in the market for three air compressors, three electric motors, one engine lathe, one upright drilling machine, one emery grinding machine, one metal-spinning lathe and small tools.

The Wilder-Pike Thermometer Company has been incorporated with a capital stock of \$25,000 to take over the business of the Charles Wilder Company, established in Peterboro, N. H., in 1860, and for the past ten years or so owned and operated by W. & L. E. Gurley, Troy, N. Y., manufacturer of engineering and surveying instruments. It will manufacture a general line of household, incubator and special purpose thermometers, metal-cased. S. M. Pike is president and treasurer. J. M. Wilder is vice-president and W. P. Dauchy is secretary.

The new factory of the Remington Arms-Union Metallic Cartridge Company, which has been under construction at Ilion, N. Y., for a year or more, is now being completed by James Stewart & Co., Inc., 30 Church Street, New York, which now has under way the last three of the 15 large buildings that comprise it. One of the new buildings will be 60 x 900 ft., four stories, and will contain 240,000 sq. ft. of floor space. A new office building will be erected, 50 x 275 ft., five stories, containing 82,500 sq. ft. of floor space and a third building will be erected, 60 x 336 ft., four stories. It is expected that the buildings will be sufficiently completed by August to permit 7000 additional workmen to be employed.

Smith Wheel, Inc., Syracuse, N. Y., has been incorporated to manufacture steel automobile truck wheels. The plant of the Syracuse Malleable Iron Works will be enlarged to manufacture these wheels by an addition 92 x 110 ft., to cost \$20,000. The addition will be used as well to increase the capacity for its own regular line of work. Burns L. Smith is president of the Wheel company; L. P. Smith, vice-president; and A. H. Trotter, general manager. These officials with P. F. Dwyer, general superintendent of the Syracuse Malleable Iron Works and J. C. Neville, general sales manager, all of Syracuse, are the board of directors.

The Dutcher Machine Company, Fulton, N. Y., has been incorporated with a capital stock of \$20,000 and has purchased the property and business of the G. J. Emeny Company, manufacturer of marine gasoline engines. It will continue this line and will also add a wood-working line. It will be in the market shortly for some equipment, but at this time is not prepared to state its exact requirements. F. D. Dutcher will be president; L. W. Emerick, vice-president and treasurer, and C. S. Hall, secretary.

The Utica Chair Company, New Hartford, N. Y., has been incorporated with a capital stock of \$20,000 to manufacture chairs. It has purchased the building and property formerly occupied by the Ilma Underwear Company and is now altering it and equipping it for its own use. George A. Armstrong, Utica, N. Y., is president and E. E. Wanamaker, Oneida, N. Y., is manager.

Berkovitz, Goldsmith & Spiegel, leather manufacturers, 34 New York Avenue, Newark, N. J., are erecting a manufacturing building and when completed will be in the market for tanning machinery, hangers, shafting, and engine generator set, etc.

The Shortsville Wheel Company, Shortsville, N. Y., manufacturer of carriage wheels, has been recently reorganized and

incorporated with a capital stock of \$25,000. The same factory organization is retained. It is operating the original plant, but within the next three months expects to move into its new brick plant, which is 40 x 300 ft.. Edwin T. Sheffer is president and treasurer; Avery R. Brown, vice-president and superintendent, and G. E. Godfrey is secretary.

The R. J. Watters Company, Iroquois Building, Buffalo, N. Y., recently incorporated with a capital stock of \$5,000, has taken over an existing plant and is manufacturing a pickling compound. R. J. Watters is president, G. E. DeGolia vice president and treasurer, and J. F. Beckert secretary.

The Jamestown Curtain Rod Company, 211 Palmer Street, Jamestown, N. Y., has been incorporated with a capital stock of \$10,000 to manufacture curtain rods and fixtures. It is at present occupying a small plant; but will probably soon go into a larger plant. John A. Lindquist is president and Otto Martenson is treasurer.

The Duplex Vitalizer Mfg. Company, Elmira, N. Y., has been incorporated with a capital stock of \$10,000, and is manufacturing a device to regulate the consumption of gasoline in automobiles. Samuel A. Pulford, 401 Realty Building, Elmira, is president; J. T. Hawley, vice-president and Clayton Hulslander, secretary and treasurer.

Several additional buildings are to be made to the plant of J. H. Williams & Co., Kenmore and O'Neil streets, Buffalo, N. Y.

The Kerr Turbine Company, Wellsville, N. Y., has completed plans and will soon let contracts for an extension to its turbine building. Pierce & Bickford, Elmira, N. Y., are the architects.

The Ludlum Steel Spring Company has let contract for erection of a one-story manufacturing building, 100 x 600 ft., at Colonie, N. Y.

The Board of Contract and Supply, Rochester, N. Y., is advertising for bids for the construction of a powerhouse, pumphouse and screenhouse at the sewage disposal plant at Irondequoit; to be of steel, brick and concrete, and estimated to cost \$80,000.

The Alpena Leather Corporation, Buffalo, has been incorporated with a capital stock of \$1,100,000 to tan and manufacture leather, etc. B. C. Taber, 291 Elm Street; A. J. Winkelman, 140 Leroy Avenue, and Perry E. Wurst, Fidelity Trust Company, are the incorporators.

The New York Air Brake Company, Watertown, N. Y., is taking bids for a powerhouse, 60 x 100 ft., one story, estimated to cost \$20,000.

The Iola Sanitarium, Rochester, N. Y., is advertising for bids for a concrete and brick powerhouse, 33 x 100 ft., one story, estimated to cost \$24,000.

The W. A. Choate Seating Corporation, Albany, has been incorporated with a capital stock of \$100,000 to manufacture supplies for schools, halls, theaters, etc. W. A. Choate, Brookview; C. G. Ogden, and W. W. Lightbody, 4 Chestnut Street, Albany, are the incorporators.

The Rochester Stamping Company, Rochester, N. Y., is building a one-story addition, 68 x 100 ft., to its plant on Anderson Avenue.

The Syracuse Chilled Die & Casting Company, Syracuse, N. Y., has let contracts for a one-story addition to its factory at 209 Sunset Avenue.

The Linde-Air-Products Company, Forty-second Street Building, New York, has started the construction of a branch plant at Dallas, Tex., one story and basement, of steel and concrete, to cost about \$30,000, which will occupy a site 290 ft. square at Harwood and Coombs streets.

The American Bearing Corporation, Glen Cove, N. Y., has been incorporated with a capital stock of \$250,000 to manufacture. The incorporators are E. T. Harwill, 1186 Dean Street; A. M. Schmidt, 556 McDonough Street, Brooklyn, and F. S. King, 315 Elm Street, Richmond Hill, New York City.

Samuel L. Moore & Sons, Elizabeth, N. J., is having plans drawn by the Ring, Cleaves, Graham Company, Elizabeth, for a one-story powerhouse, 60 x 140 ft., to cost about \$25,000. George L. Wodey is treasurer.

Albert E. Davis, 258 East 138th Street, New York, has drawn plans and was to take bids about April 25 for a factory, 72 x 135 ft., to be used for the manufacture of automobile accessories. It will cost about \$65,000. Owner's name is withheld.

The Borden's Condensed Milk Company, 108 Hudson Street, New York, has had plans drawn by Albert Ullrich, 371 Fulton Street, Brooklyn, for a two-story addition and a boiler house, for which bids are being taken.

The Public Service Gas Company, 759 Broad Street, Newark, N. J., has let contract to the W. H. White Construction Company, 382 Railroad Avenue, Hackensack, N. J., for a one-story addition to its boiler and engine house, 36 x 90 ft., and 25 x 30 ft., to cost \$12,000.

New England

BOSTON, MASS., April 24, 1916.

The freight embargoes against Naugatuck, Waterville, Bristol and New Britain, Conn., were lifted April 19. This leaves Waterbury, Torrington and Hartford as the only important manufacturing places in New England where the embargo has not been lifted or largely modified. Freight congestion in many sections is still keeping manufacturers hampered, but the seriousness of the situation is lessening.

Scarcely a day goes by without a new outbreak of labor trouble in some part of New England. The concerns most seriously affected now are the Hendey Machine Company, Torrington, Conn., the American Graphophone Company, Bridgeport, Conn., and the New England Westinghouse Company, East Springfield, Mass. The Hendey plant has been closed down for over two weeks, and the efforts of United States conciliators have apparently been of no avail to bring about a settlement. Several hundred pressmen and other employees are out at the American Graphophone works. They are demanding the straight 8-hr. day, an increase in wages, the abolition of the bonus system, recognition of the union and reinstatement of discharged employees. At the East Springfield plant of the New England Westinghouse Company about 400 men are out, and the trouble is said to be an extension of the strike at the East Pittsburgh, Pa., plants of the company. There are also small strikes of assemblers at the Colt's Patent Fire Arms Company, Hartford, Conn., of polishers at the L. S. Starrett Company, Athol, Mass., and of molders at the Davis & Furber Machine Company, North Andover, Mass.

The Murdock Damper & Bronze Company, Boston, Mass., has been incorporated, with capital stock of \$10,000, by Herbert E. Reed, Joseph H. Hawes and John W. Vaughan.

It is reported that the Stevens Machine Shops & Foundry Winooski, Vt., have been taken over by the American Woolen Company.

The Boston Lock Nut Company, Boston, Mass., has been incorporated with capital stock of \$50,000 by Otis N. Sleeper, Edward J. Prest and N. R. O'Connor.

William Johnson, owner of the Brooklyn-Street foundry, North Adams Mass., is planning to build a machine shop and foundry on Ashland Street.

The Meriden Rolling Mills Company, Meriden, Conn., has been incorporated with capital stock of \$3,000 by A. H. Armstrong and David L. Gluck, New York City; Mark Wise, Newark, Conn., and E. B. Matteson, Cheshire, Conn.

The Davis & Furber Machine Company, North Andover, Mass., has awarded a contract for an addition to its foundry, 50 x 123 ft.

The National Company, Waterbury, Conn., has given its employees a bonus of 5 per cent on their earnings during the first quarter of 1916.

The Excelsior Needle Company, Torrington, Conn., is to add one story to each of two buildings at its Chicopee, Mass., plant, and will extend another building 40 ft.

The American Chain Company, Bridgeport, Conn., has awarded a contract for a one-story addition, 52 x 90 ft.

The Plume & Atwood Mfg. Company, Waterbury, Conn., has awarded a contract for a casting shop, 75 x 190 ft., one story.

The Stamford Rolling Mills, Springdale, Conn., has plans for two additions, 102 x 112 ft. and 38 x 283 ft., one story.

The American Graphophone Company, Bridgeport, Conn., has awarded a contract for a building, 25 x 400 ft., two stories.

The George H. Dyer Company, Cambridge, Mass., is to build a machine shop, 42 x 92 ft., one story.

The Winchester Repeating Arms Company, New Haven, Conn., has awarded contracts for the erection of a forge shop, 53 x 64 ft., one story, and for an addition, 53 x 176 ft., one story, to its Winchester Avenue forge shop.

The United Fruit Company, Boston, Mass., is having plans drawn for a group of buildings to cost about \$1,000,000 to be used as a sugar refinery. The plant will be located in Charlestown, Mass.

The Westfield Industrial School, Westfield, Mass., is to build a metal-working shop, 40 x 100 ft., one story; a blacksmith shop, 26 x 34 ft., one story, and a wood-working shop, 40 x 124 ft., one story.

J. B. Prescott & Son, Webster, Mass., have begun the erection of an addition, 70 x 75 ft., 25 ft. high. The pattern shop will be moved to a new location and several small storage buildings will be built.

The J. N. LaPointe Company, New London, Conn., has purchased land at the corner of Pequot and Maple avenues and is planning to build an addition which will double the capacity of its plant.

The Worcester Lathe Company, Alonzo W. Whitcomb, proprietor, Worcester, Mass., has taken an additional floor in the building at 68 Prescott Street, doubling its floor space. Part of this space will be sub-leased to the Buckley & Whitcomb Mfg. Company, a new co-partnership of which Preston Whitcomb, son of A. W. Whitcomb, is a partner. The Buckley & Whitcomb Mfg. Company has bought the machinery of the Dawson Machine Company, 140 Foster Street, and will manufacture parts of the Worcester lathes.

R. G. Booth & Co., Bridgeport, Conn., are contemplating adding another story to their plant on Bond Street.

The C. A. Danberg Company, New Britain, Conn., has been incorporated with a capital stock of \$5,000, to conduct a foundry. Charles A. and E. J. Danberg are stockholders.

The Turner Construction Company, 11 Broadway, New York, reinforced concrete contractor, has opened a Boston Branch office at 35 Milk Street, Boston, in charge of W. R. Sides, district contract manager, and A. C. Tozzer, general superintendent.

Philadelphia

PHILADELPHIA, PA., April 24, 1916.

A movement for the development of the South Philadelphia river front, similar to the Bush Terminal at Brooklyn, is being undertaken by the industrial bureau of the Philadelphia chamber of commerce, which is negotiating with manufacturers to bring about the creation of an industrial city. The inducements offered will be low rent, insurance, trucking and labor. Its canvass of the field has been encouraging. A torpedo-boat manufacturer, a large machinery builder, a shipbuilding plant, a motor-car manufacturer and a tire-making firm have been interested in the matter.

The Midvale Steel & Ordnance Company, Nicetown, Philadelphia, has put into effect a new wage scale for high-school boys entering their plant to learn the manufacture of munitions. Until June they will be paid 17½c. per hr., after which they will receive 27½c. per hr., until such time when they become qualified to go on the regular piece-work basis which is in effect at the plant.

Indicative of the business being done at some of the munition centers is had through the freight business done now at Eddystone, Pa., where fully 200 cars are handled every day and at least 400 are held on sidings.

Three new buildings have been completed at the plant of the Thurlow Steel Company, Chester, Pa., and machinery is now being installed.

The Keystone Motor Company, East Greenville, Pa., has been incorporated with stockholders located throughout the Perkiomen Valley. It will erect a plant. Arthur Yocum is president; A. L. Miller, vice-president; John L. Dimmig, secretary, and F. M. Moll, treasurer.

The Clarke Can Company, manufacturer of druggists' tinware, 1012 Passyunk Avenue, Philadelphia, which last year purchased the former Tait & Sisler tin can factory, is now running both plants at full capacity; and plans extensions which will increase its working force from 200 to 250 men and will require about \$5,000 worth of new machinery. This is only the beginning of what the company expects to spend in a very short time. James A. Clarke and William A. Hunter are the proprietors.

The Keystone Motor Car Company, Tenth and Market streets, Harrisburg, Pa., has awarded contract for the erection of a two-story brick and steel fireproof service building, 100 x 118 ft., on South Cameron Street, near Mulberry Street, for \$25,000. It will be equipped with a repair shop, paint shop, etc.

The bursting of a high-pressure oil line at the plant of the Traylor Engineering & Mfg. Company, Tenth and Mill streets, Allentown, Pa., April 14, caused a fire which, for a while, threatened its No. 1 machine shop, a frame and corrugated iron building about 200 ft. long. It was only the hard work of the company's own fire fighting forces that prevented a serious conflagration.

The Midvale Steel & Ordnance Company, which took over the contract for 2,000,000 rifles, taken originally by the Remington Arms Company of Delaware, is reported to have made its first shipment of completed rifles. The initial delivery was not large, but inasmuch as the rifle plant is now working smoothly it is expected that shipments will gradually grow larger. The rifles have been tested by British naval experts and pronounced fully up to specifications. Progress in turning out the rifles would have been greater had it not been for the necessity of training the employees. The work has been highly departmentalized.

Day & Zimmermann, engineers, 611 Chestnut Street, Philadelphia, has let contract to James C. Driscoll, Weightman Building, for the erection of a two-story addition, 85 x 100 ft., to the plant of the Nitrogenous Chemical Company, Thirty-seventh and Tasker streets, Philadelphia.

Chicago

CHICAGO, April 25, 1916.

The pace is slowing down in the machinery market. Builders of machines that have been brought out to meet the exceptional demand of the past several months are getting their product, especially lathes, into the hands of the dealers. The situation now permits of a much easier accommodation of the demand. In addition the easier deliveries of certain standard lines of tools, which began to be available several weeks ago, are being maintained. A strong pressure, however, still is attached to the handling of business on the books, and manufacturers are experiencing but little of the relief that is general with dealers. The past week showed a record of fair sales, although contracts are now likely to give a normal business more prominence than it deserves.

The South Shore Foundry Company, Chicago, has been organized with a capital of \$2,500 by Albert H. Victor, 227 Swann Street; Allis Perz and William Riddle.

The Lasker Iron Works, 2830 South Ashland Avenue, Chicago, operating a boiler shop for a number of years past has let the contracts for a new shop, 100 x 300 ft., to cost about \$25,000.

The Ford Motor Company, Chicago, has taken over additional property adjoining its service station for the purpose of extending its facilities.

The Louis Geyler Company, 2500 South Michigan Avenue, has let the building contracts for a three-story auto service station to be 80 x 180 ft., and to cost \$85,000.

Fire completely destroyed the varnish factory of the Globe Mfg. Company, Peoria, Ill., with an estimated loss of \$15,000.

The B. E. S. Tool & Mfg. Company, Rockford, Ill., L. R. Bolles, president, organized a few months ago to do general contract work in the manufacture of jigs, tools and dies, is rapidly expanding its operations.

The Plains Iron Works Company, Denver, Col., has been organized with a capital of \$250,000 to take over the business and plant of the F. M. Davis Iron Works Company. Mr. Charles Tully, Lakeside, Neb., is president.

The Atchison, Topeka & Santa Fé Railway has completed plans for the erection of a roundhouse and complete repair shops at Gallup, N. M., the total cost of the buildings and equipment to exceed \$60,000. The buildings are to include a 24-stall roundhouse, machine shop and blacksmith shop, store house, planing mill, car repair shed and power plant.

The Northwestern Shot & Lead Company, 90 Fairfield Avenue, St. Paul, Minn., plans a reinforced concrete addition to its plant costing \$10,000. It will be 50 x 67 ft., two stories, and plans will be prepared by the Tolz Engineering Company.

The Denver Iron Works & Foundry Company has sold its location at 1827 Wynkoop Street, and is erecting a new plant at 1408 West Colfax Avenue, Denver, Col., consisting of a machine shop, 25 x 104 ft., and a foundry, 46 x 125 ft., equipped with two cupolas, to be ready for operation May 15. The total cost will be about \$16,000. George M. Sibley is president.

Detroit

DETROIT, MICH., April 24, 1916.

The Detroit Bearing & Casting Company, Detroit, has been incorporated with \$110,000 capital stock to manufacture foundry products. The incorporators are Edward H. Mills, Thomas P. Nerny and Fred J. Kandt.

The Robinson Machine Company, Detroit, has been incorporated with \$50,000 capital stock to do a general machine shop business. The incorporators are Alfred Robinson, Michael Sullivan and D. P. Cassidy. The plant will be located at Ecorse, a Detroit suburb.

The New Era Spring & Specialty Company, Detroit, has acquired the factory of the National Shock Absorber Company, Grand Rapids, Mich., which it will operate as a branch plant.

Announcement has been made that the Chevrolet Motor Company, Flint, Mich., will erect additional buildings at an estimated cost of \$750,000, which will include an assembly plant, an axle factory, a central heating plant and a large warehouse.

The Gas Oil Stove Company, Detroit, has been incorporated with \$50,000 capital stock to manufacture oil stoves. The incorporators are William J. Best, Nathan C. Chapman and Hawley E. Daines.

The Piston Ring Company, Muskegon, Mich., will double the capacity of its plant by the erection of two additional buildings. The outlay will involve about \$75,000.

The American Carbonate Company, Escanaba, Mich., will

establish a plant to manufacture potash. John E. McCarthy and Gordon Shipman are at the head of the company.

The Continental Motor Company, Muskegon, Mich., has begun the erection of a large addition to its machine shop.

The Saranac Machine Works, Benton Harbor, Mich., will erect an addition to its plant.

The Machinery Company of America, Grand Rapids, Mich., has been organized with a capital of \$30,000.

The Chelsea Screw Company, Chelsea, Mich., has been re-organized with a capital of \$50,000 and will construct a new plant. M. J. Dunkle is president.

The Steel Furniture Company, Grand Rapids, Mich., will build a factory addition, to cost \$13,600.

The Grand Rapids Blow Pipe & Dust Arrestor Company, Grand Rapids, Mich., has plans for a new factory, 50 x 220 ft., of brick and hollow tile construction.

The Republic Motor Truck Company, Alma, Mich., will build an addition to its plant, 60 x 500 ft.

Milwaukee

MILWAUKEE, WIS., April 24, 1916.

A steady stream of orders for single tools or small lots continues to flow into Milwaukee machine-tool works, and here and there comes an inquiry for a full shop equipment. These inquiries are regarded as tests of the market condition. Up to this time it has been necessary for tool builders to respond with uncertainty as to deliveries, because their capacities are still taken up with back orders. Night and day operations are being continued. The milling machine trade is particularly brisk and rather stands out from the volume of orders. The shortage of cars is particularly serious in Wisconsin. It has called forth from the state railroad commission an appeal to shippers and railroads alike to co-operate more closely, so that cars may be released for use with the least possible delay. The commission has been investigating and finds in one survey that out of 102 cars of various commodities shipped from points in Wisconsin, 78 cars loaded to capacity would have sufficed. This is to emphasize the necessity of loading all cars to maximum weights. Two large Milwaukee metal-working companies have announced the general insurance of all employees. The labor situation is satisfactory, although here and there an outcropping of unrest appears.

The Falls Machine Company, Sheboygan Falls, Wis., has completed a machine shop, 40 x 250 ft., and will undertake lesser improvements at once. While the company's 1915 business ran above \$1,000,000, the volume of the first quarter of 1916 was in excess of \$500,000, and contracts for future delivery amounting to \$2,500,000 are now on the books. The principal product is automobile motors, but it also produces wood-working machinery. The force numbers 350 and is being increased.

The National Weighing Apparatus Company, 917 Third Street, Milwaukee, has taken over the former plant of the Milwaukee Separator Company, 267-273 Sixth Street, where much larger production and office space is available. John Malenscheck is president; John Dobnik, vice-president, and John L. Malenscheck, secretary and treasurer.

A small machine shop is being erected on Racine Street, Jefferson, Wis., by John Moser.

Frank Martin, Minneapolis, Minn., has purchased the machine shop of Fred S. Bell & Son, Mosinee, Wis., and takes immediate possession.

The Green Bay & Eastern Railway Company, Manitowoc, Wis., organized recently, plans to start work on the first unit, from Green Bay to Manitowoc. Timothy E. Burke, Green Bay, is attorney.

The Standard Livery Company, 411-415 Prairie Street, Milwaukee, has awarded contracts for the erection of a garage, machine shop and storage building at Fifth and Prairie streets, to cost \$35,000. It will be of reinforced concrete and brick, 50 x 150 ft., three stories and basement. F. W. Andree, Cawker Building, is architect, and The Raulf Company, Patton Building, is general contractor.

The south or automatic screw machine works of the Harley-Davidson Motor Company, Milwaukee, at 160 Clinton Street, is being remodeled and fireproofed. Some new equipment will be installed.

The Twin City Automobile Company, Marinette, Wis., will build an ell-shaped garage and machine shop, 30 x 100 x 127 ft.

The United States Electric Tool Company, 150 Oneida Street, Milwaukee, has changed its corporate style to the Pan-American Electric Tool Company to distinguish it from other companies of the same name. John C. Zeman is secretary.

The Algoma Motor Car Company, Algoma, Wis., has

awarded contract for the erection of a garage and machine shop, 60 x 160 ft., one and two stories.

A new high school with manual training department will be erected at Sauk City, Wis., at a cost of \$40,000. C. O. Newlan is secretary of the board of education.

The foundry and machine shop of the International Hoist Company, Antigo, Wis., which made an assignment in favor of J. C. Wright several months ago, have been taken over on a long-term lease by Mayer Brothers, machinists, Rhineland, Wis., who take immediate possession. The members of the firm are Louis and Lorenz Mayer. Both shops are being overhauled and will be in operation by May 10. The new operators will install two 2-ton electric traveling cranes and a small lot of tool equipment.

An issue of \$750,000 worth of municipal bonds for the construction and equipment of a municipal electric light plant, to be used at first for street illumination, has been voted by Milwaukee, Wis. Plans are being prepared by Vaughan, Meyer & Sweet, engineers, Majestic Building. No date has been set for taking bids. Fred G. Simmons is commissioner of public works.

Articles of incorporation have been filed by the Gorton Fence Company, Racine, Wis., with a capital stock of \$10,000 by George Gorton, C. C. Gittings and A. R. Janeky.

The Ozaukee Heater Company, Saukville, Wis., has been organized to manufacture oil burners and stoves. Three acres of land have been purchased and contracts awarded for the erection of the first unit of the plant, 36 x 125 ft., to be ready June 1. Fifty workmen will be employed at the start.

The new factory of the J. C. Nichols Harness Company, to be erected at Sheboygan, Wis., will be built by William Guenther & Sons. Specifications call for a two-story shop, 70 x 236 ft., and a boilerhouse, 32 x 79 ft.

The I. B. Rowell Mfg. Company, Waukesha, Wis., which has been specializing in the manufacture of drills, seeders and other farm equipment, has taken contracts for 60,000 self-starting units for Ford cars, and another for a large number of road surfacers. The force is being increased.

Nicholas Strommer, Gillett, Wis., has started work on a garage, 40 x 90 ft., with a machine shop annex, 20 x 40 ft.

The Wisconsin Woodworking Company, Two Rivers, Wis., has plans completed for the erection of a new plant.

The Gillette Safety Tire Company, Eau Claire, Wis., has awarded contracts for the erection of its new factory.

Indianapolis

INDIANAPOLIS, IND., April 24, 1916.

The Clinton Switch Company, Clinton, Ind., has been incorporated with \$10,000 capital stock to manufacture switches and railroad supplies. The directors are Howard Hughes, Arthur Ferguson and Harry L. Lowe.

The Hoosier Castings Company, Connersville, Ind., has increased its capital stock from \$35,000 to \$50,000.

The Midland Chair & Seating Company, Michigan City, Ind., has been sold by the receiver to Karpen Brothers, Chicago, for \$88,549. The plants will be kept in operation.

The United Refrigerator Companies, Peru, Ind., have bought factory buildings at Richmond, Ind., to which its plant will be moved.

The Rutenber Electric Company has signed a contract with the Association of Commerce, Marion, Ind., to establish a factory there. The company, located at Logansport, Ind., has increased its capital stock from \$85,000 to \$200,000.

The Sterling Metal Company, Auburn, Ind., organized with \$25,000 capital stock, will make knives and forks, dental and plumbers supplies. Orlando Rex is president and A. L. Kuhlman secretary.

The Roachdale Electric Company, Roachdale, Ind., has been incorporated with \$50,000 capital stock to supply electricity. The directors are R. F. Edwards, Harvey Chastain and G. E. Turner.

The Wayne Oil Tank Company, Fort Wayne, Ind., has increased its capital stock from \$400,000 to \$500,000.

D. C. Chappell, Jr., has been appointed trustee in bankruptcy of the Allen Automobile Company, Evansville, Ind.

The United States Self-Renovating Company has been incorporated at Anderson, Ind., with \$40,000 capital stock to manufacture rug cleaners. The directors are George B. Ujdegrove, Philip L. Bauer and Fred R. Eaton.

The Allen Ticket Holder Company, Indianapolis, has been incorporated with \$30,000 capital stock to manufacture ticket holders. The directors are Ernest L. Allen and Matt Bauer, Elrosa, Minn.; W. B. Allen, Eckman, N. D.

The Western Columbia Cabinet Company, Indianapolis, has bought a site of four acres, on which a plant will be located.

The Hydro-Stone Company, Indianapolis, has been incorporated with \$100,000 capital stock to manufacture cement blocks. Henry Abrams, C. N. Elliott and W. J. Henley are the directors.

The Federal Pattern Works, Indianapolis, has been incorporated with \$10,000 capital stock to make metal and wood patterns. The directors are Thomas A. Lavelle, Frank D. Henzie and Thomas J. Jones.

The Kolograph Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture moving picture machines. L. D. Kohlmeyer, William C. Hauelsen, Charles W. Craig, L. G. Deschler and A. W. McKeand are the directors.

The Superior Machine Tool Company, Kokomo, Ind., has filed preliminary certificates of dissolution.

The United States Slicing Machine Company, LaPorte, Ind., will erect an addition to its factory.

The National Boiler & Sheet Iron Works, Indianapolis, Ind., will discontinue its operations and has sold its equipment to Joseph T. Ryerson & Sons, Chicago.

Cincinnati

CINCINNATI, OHIO, April 24, 1916.

Car manufacturers are said to be contemplating adding to their machine shop equipment, but no general lists have been sent out. The auto-truck and automobile manufacturers continue the best customers for machine tools, as the export demand is easing off. Munition makers have also bought a considerable number of machine tools lately. One recent purchase was made by a Dayton, Ohio, firm, involving 50 automatic screw machines.

Second-hand machinery dealers report more business with a better available supply of small sized lathes, although the larger sizes are still scarce. The boiler and tank business is improving, but the high cost of plates is a matter of much concern.

Machinists in a large oil mill machinery manufacturing plant at Piqua, Ohio, recently made demands for a recognition of the union and an 8-hour day. The refusal of the company's officials to accede to the demands led to a strike, but late reports indicate that the majority of the men contemplate returning to work at an early date. The local labor situation is unchanged. A number of molders in Springfield, Ohio, are still out, the jobbing foundries being mainly affected. At Columbus, Ohio, one large shop is still operating with a reduced force of machinists. This is the only plant there that is embarrassed to any extent.

The Goodman Mfg. Company, Chicago, Ill., manufacturer of coal mining machinery, will open a branch office and store room at 321 Sycamore Street, Cincinnati.

The Edna Brass Mfg. Company, Cincinnati, will build a two-story brick addition, 60 x 67 ft., to its plant on Reading Road.

The Reliance Paint Company, Cincinnati, recently incorporated with \$250,000 capital stock, has leased a building at 203 Main Street. Manufacturing plans have not yet been given out.

The Corryville Garage Company, Cincinnati, has been incorporated with \$10,000 capital stock by Alfred Geisler and others to operate a garage and repair shop.

The National Lead Company, Cincinnati, has taken out a permit for an addition to its plant on Freeman Avenue, estimated to cost \$11,000.

The American Tool Works Company, Cincinnati, has secured a permit for its proposed plant on Eggleston Avenue, estimated to cost \$300,000.

The Weir Frog Company, Cincinnati, officially denies the report that it intends moving its factory from Norwood, a Cincinnati suburb. It is operating with a full force and reports orders from the railroads rapidly increasing in volume.

The American Milling Machine Company, formerly at Batavia, Ohio, now has in operation a plant at Ludlow, Ky., and in addition to building milling machines is assembling 24-in. x 10-ft. lathes for the Carroll-Jameson Machine Tool Company, of Batavia, Ohio.

The Queen City Printing Ink Company, Cincinnati, has plans under way for an addition to its plant.

The plant of the Buckeye Mfg. & Foundry Company, Overpeck, Ohio, was almost totally destroyed by fire April 17 with an estimated loss of \$25,000. It will be rebuilt at once. Louis P. Hurm and Oscar Eberhardt, of Hamilton, Ohio, are the principal stockholders.

The Harrison Balancing Machine Company, Hamilton, Ohio, has been incorporated with \$1,500,000 capital stock by M. A. Fanning, J. P. Harrison, Jr., and others. No manufacturing details are yet available.

The Munitions Mfg. Company, Dayton, Ohio, has been incorporated with \$150,000 capital stock by P. J. Mitten and others. It is understood that the company has a large contract for shrapnel timing fuses.

The Monarch Machine Tool Company, Sidney, Ohio, has increased its capital stock from \$50,000 to \$250,000. It has lately made some extensive additions to its plant.

The Spencer Metal Products Company, Spencer, Ohio, has been incorporated with \$25,000 capital stock by R. F. Vandemark, H. Y. Hooper, and others.

Cleveland

CLEVELAND, OHIO, April 24, 1916.

The machine-tool market is only moderately active, sales being limited for the most part to single tools or small lots. A Dayton, Ohio, maker of automobile accessories placed orders in this market last week for round lots of machine tools, and some other good business is in prospect from the same city. Milling, planing and screw machines are in good demand; but the call for lathes has fallen off. Grinders are in heavy demand and scarce for early delivery. Builders of turret lathes report a fair volume of domestic business, but with an increased output and with the recent slackening of orders some are beginning to catch up slightly on deliveries. Some scattered buying of single tools is being done by railroads. The supply of labor in both machine shops and foundries is still scarce and the tendency is toward higher wages for common labor. Operations in several northern Ohio foundries are being hampered by strikes.

The Gravity Carburetor Company, Cleveland, Ohio, has purchased the plant of the Ohio Roofing Company at Perkins Avenue and East Thirty-seventh Street and will occupy it shortly for manufacturing purposes. Some new machine tool equipment will be required.

The Strong, Carlisle & Hammond Company, machinery dealer, Cleveland, Ohio, will move its Detroit, Mich., sales office on May 1 to the Dodge Building, 270 Jefferson Avenue, where larger quarters will be provided.

The Adamson Company, East Palestine, Ohio, maker of vulcanizers and other automobile accessories, has started the erection of a three-story brick and steel factory, 45 x 125 ft. Additional machinery equipment will be required. A provision in the plans provides for a foundry addition for making light gray iron and brass castings.

The Trumbull Mfg. Company, Warren, Ohio, will enlarge its plant by the erection of a brick addition, 58 x 175 ft., either two or three stories, largely for warehouse purposes.

The Ironwood Mfg. Company, Bellefontaine, Ohio, will erect a fireproof building about 35 x 75 ft. The company manufactures agricultural implements and does jobbing machine work.

The Peerless Drawn Steel Company, Massillon, Ohio, is planning an enlargement to its plant by the erection of three new buildings, 42 x 80 ft., 40 x 80 ft., and 35 x 90 ft., all one story.

The B. F. Goodrich Company, Akron, Ohio, will erect a blacksmith shop, 60 x 80 ft.

It is announced that the Canfield Gas & Electric Company, Canfield, Ohio, recently incorporated with a capital stock of \$100,000, plans the erection of an electric lighting plant.

The Springfield branch of the Gem City Machine Company has been incorporated with a capital stock of \$100,000 under the name of the Steel Products Engineering Company, Springfield, Ohio. It has purchased a three and one-half story building at Dakota Avenue and Columbia Street, having a little over 10,000 sq. ft. of floor space, which it has equipped for the manufacture of tools and for general contract machining. The former tool equipment has been doubled and heavy duty and chucking lathes, milling and shaping machines have been installed. H. H. Swope is in charge.

Baltimore

BALTIMORE, MD., April 24, 1916.

The Artillery Fuse Company, South Wilmington, Del., has taken out building permits to the value of over \$60,000 for addition to its plant. Since the beginning of the war it has added about \$400,000 worth of buildings and equipment. G. B. Woolson is treasurer.

The Union Soap Company, 214 North Pearl Street, Baltimore, will install a 60-hp. boiler.

W. W. Kemp, 401 East Oliver Street, Baltimore, is having plans prepared for a two-story garage at 1418 Belvidere Street, 50 x 70 ft.

The Pulaski Foundry & Machine Company, Pulaski, Va., has been incorporated with \$50,000 capital stock. Robert Buntz, Jr., is president and O. C. Brewer secretary.

Birmingham

BIRMINGHAM, ALA., April 24, 1916.

Wholesale dealers report a smaller volume of business than in some weeks, but are satisfied with ruling conditions. Pumps, engines and boilers and gasoline engines and other regular lines are active. Machine tools are as difficult to secure as ever. Blast furnace equipment is so uncertain of delivery that several Alabama stacks under repair may be delayed several months in resumption. This is especially true with regard to blowing engines, gears, etc. A large amount of very heavy machinery, formerly procurable in sixty days, is now scheduled for delivery in six months.

The Alabama Power Company has selected a point on the Warrior River, 18 miles south of Cordova, for its auxiliary steam power plant, and will break ground in the immediate future.

The Atlanta Gear & Machine Company, Atlanta, Ga., has been incorporated with \$2,500 capital stock by A. H. Plante, G. V. Plante, and others.

The Davis Nut-Lock Company, Macon, Ga., has been incorporated with a capital stock of \$25,000 by J. E. Passmore, Macon; A. H. Passmore, Valdosta, Ga., and others.

The Dixie Pressed Steel Wheel Company, Atlanta, has been incorporated by G. Bennington, D. K. Johnston and C. R. Topping with a capital stock of \$100,000.

The Products Company, Fairhope, Ala., has been incorporated with capital stock of \$100,000 to manufacture brick, etc., by E. C. Wolcott and others.

The Carlisle Gin Company, Attalla, Ala., has been incorporated by N. B. Ware, E. B. Johnson, V. H. Rowen, and others, with a capital stock of \$35,000.

The Charlotte Electric Repair Company, 508 West Fourth Street, Charlotte, N. C., has purchased a site on the Piedmont & Northern Railroad, near the city, and will erect a plant one-story, 50 x 150 ft., of concrete construction, for the repair of electrical machinery. It will be equipped with coil-making, armature-winding and transformer impregnating machinery. W. A. Lawrence is president.

A company called the National Dye & Munitions Company has been formed by R. P. Gibson, Rocky Mount, N. C., and others. It is negotiating for the purchase of 10,000 acres of land, including mineral and coal rights, at Sanford, N. C.; and is said to be planning the erection of a plant at Cummock, six miles away.

The Central South

LOUISVILLE, KY., April 24, 1916.

Inquiries continue to come in and much the same difficulty as heretofore is found in obtaining materials. An embargo announced by the Louisville & Nashville and in effect with the Illinois Central Railroad on shipments for points east of Pittsburgh, Huntington, etc., is not expected to affect the local traffic situation much, except that it may still further delay receipts from Eastern points, which, however, are now holding more than their proportion of cars from this section.

The Louisville Chemical Company, 108 South Third Street, Louisville, has plans for enlarging its plant. A boilerhouse will be constructed and a boiler of from 6 to 10-hp. installed. B. F. Gregory is president and general manager.

The Fiscal Court of Jefferson County, Russell Gaines, engineer, Samuel Greene, County Judge, sitting at Louisville, will fit out a machine shop at the Jefferson County armory in which repair work on the county automobiles will be performed. Charles C. Foster is armory custodian.

The Lion Universal Mfg. Company has incorporated with \$20,000 capital, and proposes to establish a plant for the manufacture of mechanical and electrical devices for commercial and advertising purposes. The incorporators are R. W. Schauburger, Harry J. Wolff, of Louisville, and F. A. Lang, Jeffersonville, Ind.

A one-story brick shop will be constructed by the National Foundry & Machine Company, 1408 West Main Street, Louisville.

Bowling Green, Ky., has inaugurated a factory movement and is promoting a box and crate plant in connection with the rapid development of fruit plantations. The Warren Strawberry Growers' Association will next year buy \$50,000 of strawberry boxes and crates. The secretary of the association may be addressed.

The Clark Gate Company, Lexington, Ky., incorporated with \$50,000 capital, will manufacture a patented farm gate and has bought the plant of the Bluegrass Lumber Company which it will fit for its purposes. E. R. Bradley is president.

O. R. Williams, vice-president and general manager; J. R. Clark, treasurer, and Barry Shannon, secretary.

The Adams Utility Company, Sulphur, Ky., which purchased the light franchise recently sold by LaGrange, Ky., is reported to have disposed of it to other interests which project a dual light and water plant. Mayor French of LaGrange may be addressed.

Fire destroyed the handle factory in East London, Ky., of the Turner, Day & Woolworth Company, Louisville, with a loss of \$3,000. It is reported that the plant will be rebuilt. L. B. Murphy is manager at East London, and Charles D. Gates, Louisville, is president.

In connection with completion of its run by the Dover Pearl Button Company, Dover, Ohio, it is reported that the plant is to be taken over by another firm, and that 30 shell-turning machines will be added to the plant and operations continued on a larger scale.

Local capitalists at Evansville, Ind., have agreed to subscribe \$200,000 for the organization of a company to build an ice and refrigerating plant.

G. M. Shaw & Co., Memphis, have plans for two buildings to be erected, one a building for the Memphis Overland Company, to cost \$40,000 including garage, and the other a sales and service station for the 638 Tire & Vulcanizing Company to cost \$35,000.

G. N. Hillman will build a garage at Nashville, Tenn., 96 x 165 ft.

The National Drafting Machine Company, Nashville, Tenn., has been incorporated with \$10,000 capital by W. A. Adams, E. E. Murrey, C. H. Beasley, and others.

The John G. Duncan Company, 308 West Jackson Avenue, Knoxville, Tenn., is asking for jobbers' prices plus freight rate to Knoxville on a 150-hp. second-hand return-tubular boiler of 125 to 150 lb. per sq. in. working pressure.

Inquiries as to machinery for manufacturing grindstones are being made by Hardison, Crain & Co., Lewisburg, Tenn.

Operations have begun at Henderson, Ky., on a new plant which the John J. Delker Carriage Company will occupy as a buggy factory.

St. Louis

ST. LOUIS, Mo., April 24, 1916.

The machine-tool trade shows the increased development of industrial enterprises, demand being mostly for equipment for new companies, although extensions and replacements of established firms are a strong feature. Deliveries are slightly improved, though far from satisfactory. Collections are very good, money easy and available for new enterprises, particularly where equipment can be had with reasonable promptness.

The American Liquid Heat Company, St. Louis, Mo., has been incorporated with a capital stock of \$150,000 by Seymour and Edwin Schiele, St. Louis; L. A. Coate, Chicago, and others, and will equip a plant to manufacture a patented heat producing device.

The Krisman-Frey Jewelry Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$12,500 by David Krisman, George Frey and Archer King to manufacture jewelry, etc.

The Delta Chemical Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by Guy W. Stewart, W. F. Miller and Monet G. Price to manufacture drugs and chemicals.

The McBee Binder Company, St. Louis, Mo., has leased new quarters into which it will move and add equipment to its plant for the manufacture of binders and sundries.

The Samuel Cupples Woodenware Company, St. Louis, Mo., has contracted for the erection of a building which it will equip to manufacture handles, ladders, etc.

The Missouri Malleable Iron Company, St. Louis, Mo., will erect a new foundry to cost \$3,000.

The Usona Mfg. Company, St. Louis, Mo., has acquired quarters at 826 South Eighteenth Street and will install equipment to manufacture iron wire, brass and bronze products. I. Graham is president and F. C. G. Long secretary and treasurer.

The Harry L. Hussmann Refrigerator & Supply Company, St. Louis, Mo., will install equipment to manufacture refrigerators, butchers' supplies, etc., and will require wood-working machinery. Harry L. Hussmann is president.

The Krey Packing Company, St. Louis, Mo., will equip a garage to include a machine and repair shop for handling its automobile delivery service.

The Signalite Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$50,000 by W. M. Farr, L. F. Jones and L. R. Fraker and will equip a plant to manufacture automatic automobile signalling devices.

The American Sealer Company, Kansas City, Mo., has been incorporated with a capital stock of \$15,000 by B. R. Bennett, G. W. Schneider and R. B. Gordon, and will manufacture sealing machines.

The Arkansas Light & Power Company, Arkadelphia, Ark., has bought the electric light and power plant at DeQueen, Ark., and will expend about \$20,000 on new equipment.

The Geridge Lumber Company, Geridge, Ark., has organized with G. W. Allport as president and M. A. Jones manager, and will install equipment for a daily capacity of 30,000 ft. of hardwood lumber.

The Fountain City Lumber Company, Siloam Springs, Ark., has been incorporated with a capital stock of \$15,000 by J. H. Bowman, R. W. Coleman and Connelly Harrington and will install mill equipment.

The Export Coopage Company, Leslie, Ark., has been organized with a capital of \$300,000 to take over the plants of the H. D. Williams Coopage Company, which will be remodeled. Some new equipment is being considered.

The St. Louis, Iron Mountain & Southern Railway, St. Louis, Mo., is reported as having plans for an engine house and repair shop at Texarkana, Ark. E. A. Hadley is chief engineer.

The Kingston Cotton & Oil Company, Kingston, Okla., will equip a cold press mill, three cotton gins and a boiler plant. C. C. Chestnut is president and manager.

The Yukon Mill & Grain Company, Yukon, Okla., will equip a reinforced concrete elevator of 500,000 bu. capacity.

Howe, Okla., will expend about \$100,000 to equip an electric light plant and a waterworks system. Address the mayor.

The Kusa Ice, Light & Power Company, Kusa, Okla., has been incorporated with a capital stock of \$25,000 by John G. Goshorn, Henryetta, Okla.; D. F. Servey, Iola, Kan., and R. G. Clark, Kansas City, Mo., and will equip a plant.

The Benham Engineering Company, Oklahoma City, will equip an electric light and power plant and waterworks system at New Wilson, Okla., including one 50-kw., 2300-volt 60-cycle, three-phase generator, one 70-hp. oil engine, elevated tank, etc. C. W. Henson is city clerk.

H. P. Anderson and others, of Tulsa, Okla., representing St. Louis capital, will equip a cold-storage plant at Tulsa, to cost about \$300,000.

The Southwestern Tire Mfg. Company, Colcord Building, Oklahoma City, Okla., has been organized with John L. McClelland president, and will install a plant requiring an investment of about \$200,000.

The Woodward Mfg. Company, Woodward, Okla., has been incorporated with a capital stock of \$25,000 by J. E. Maybee, J. D. Gray and E. L. Sill and will equip a plant to manufacture pneumatic horse collars and other harness. Presses, blank and forming dies, enameling oven and plating equipment are wanted.

Dustin, Okla., has voted \$8,000 for additional equipment for the waterworks pumping plant.

Oklahoma City, Okla., will make an expenditure of about \$1,100,000 for a reservoir of about 7,000,000,000 gal. capacity together with all necessary equipment. Guy V. McClure is city engineer.

Georgetown, Miss., will equip a waterworks plant to cost about \$25,000. Xavier A. Kramer, Magnolia, Miss., is in charge.

Lowell R. Gaidry, New Orleans, La., is reported in the market for both power-driven and hand-driven centrifugal equipment for laboratory work.

Amite City, La., will expend about \$40,000 on a waterworks system. Xavier A. Kramer, Magnolia, Miss., engineer, is in charge.

West Monroe, La., will equip an extension of its waterworks plant, including electric pump and filtering plant and will also install additional electric light equipment. Address the mayor.

San Francisco

SAN FRANCISCO, CAL., April 18, 1916.

The demand for tools and machinery is broadening considerably; orders for all classes of equipment are being placed by many who have held off for a long time. Further large orders have come from the Union Iron Works, which is also taking bids for the construction of its new drydock at Hunters Point. Other shipbuilders are active buyers and purchases include marine, gas and Diesel-type engines. Railroad business is a feature of some importance. The smaller machine and boiler shops are quite busy, and sales of general shop supplies are passing all records. The demand for 14 and 16-in. lathes for garage equipment is very strong, but few

can be had, either new or second-hand. General equipment for the lumber, mining and oil industries is unusually active, and inquiries are appearing from numerous chemical development projects. Irrigation and electrical machinery is selling well.

Andrew F. Mahoney, San Francisco, has ordered the construction of two lumber-carrying vessels, each to be equipped with two 160-hp. Bolinder oil engines.

The San Joaquin Light & Power Corporation, Los Angeles, will expend \$500,000 for the completion of a power plant in Crane Valley, on which preliminary work has been done.

The Independent Oil Producers' Agency, Bakersfield, Cal., will build a refinery at a cost of \$25,000 to produce gasoline by the Rittman process.

The Zellerbach Paper Company, San Francisco, is having plans prepared for a new warehouse and manufacturing plant, in which all freight-handling equipment and machinery will be motor-driven.

The Alpaugh Irrigation District, Alpaugh, Cal., is taking figures on a large pumping plant.

Turlock, Cal., is taking bids on a centrifugal pump and electric motor.

The United States Rubber Company of California, Los Angeles, is preparing to occupy a new building and will install a hydraulic press for putting on truck tires.

Owing to the increased activity of its Oakland shipyards the Moore & Scott Iron Works has moved its main office from San Francisco to the foot of Adeline Street, Oakland.

The Union Iron Works, San Francisco, has taken orders for four more steamers, to be built at its Oakland plant.

The Pacific Northwest

SEATTLE, WASH., April 18, 1916.

Indications are that the summer will mark the return of prosperous conditions for the Northwest. The lumber industry is receiving new impetus daily, and hundreds of plants throughout the Puget Sound and Northwest districts, which have been idle for several years, have resumed full operation. Machinery houses report an unusually brisk demand, with extremely heavy shipments for mining districts. Cannery supplies are especially active.

Seattle, Tacoma and Bellingham firms have recently received orders from Europe for 36,000,000 ft. of lumber in the form of knock-down houses, a large part to go to Russia. The shipment will aggregate 24,000 tons, and will require twelve vessels. The Seattle Port Commission has been notified that shipments will be made through the public terminals.

The East Oregon Lumber Company, Enterprise, Ore., is planning improvements and extensions to its mill. Two new boilers will be installed.

The Mountain Timber Company, Kalama, Wash., whose sawmill was destroyed by fire eighteen months ago announces that the plant will be rebuilt at once.

The Columbia River Construction Company, Davenport, Wash., plans the installation of machinery to manufacture Helm pressed brick and concrete block at Lincoln, Wash.

The H. S. Jeffery Machinery Company, Seattle, has moved its sales rooms to 546 First Avenue South.

Katon Finster, Gardiner, Ore., and L. C. Schilling, Five Mile Lake, Ore., have taken over the Westlake sawmill, Westlake, Ore., and will immediately tear down the old plant and erect a new one with a capacity of 30,000 ft. daily. A box factory in connection with the mill will be erected at a later date.

The Adjustable Electric Socket Company, Dallas, Ore., manufacturer of surgical equipment and appliances, has been reorganized and will begin the manufacture of a full line of its products. Additional equipment has been installed.

The American Company has purchased a large site on the Seattle waterfront on which it plans to erect a plant to cost \$500,000, according to Henry W. Phelps, vice-president. It will be ready for occupancy by Nov. 1.

The Trans-Pacific Marine Company, Seattle, Wash., is being organized by J. H. Bloedel, president of the Bloedel-Donovan Lumber Mills, as trustee, to construct shipyards on Puget Sound for the manufacture of ocean-going vessels. It will build at once in other shipyards three vessels, to cost about \$150,000, and will start the construction of its own yard without delay. Spokane, Seattle and Bellingham capitalists are interested in the company.

The Atlas Foundry & Machine Company, Tacoma, Wash., plans the erection of a three-story fireproof pattern storage building, 32 x 100 ft., from plans by Heath & Gove. John Hartman is secretary.

The Beaver Portland Cement Company, Gold Hill, Ore., is constructing a plant to produce cement and limestone flour, which will have the largest output on the coast. A new limestone quarry is being opened near Gold Hill.

Canada

TORONTO, April 22, 1916.

Not only Canadian iron and steel plants, but textile and other manufacturing plants are working to full capacity, and are under the necessity of increasing their facilities. This many are doing, where there exists a reasonable prospect of a sufficient supply of labor, the problem of which is becoming more and more serious. The output of industries is increasing in bulk and in value, a result due chiefly to greater efficiency. The Imperial Shells Committee is receiving new orders almost weekly, and these are being placed with such companies as are able to turn them out in the shortest possible time. The P. Lyall Construction Company, Montreal, is receiving large orders for war munitions, which are supplementing large building contracts. A great deal of faith is placed in the successful outcome of the tests of a new chain shell, which the Lyall Company will manufacture for the Russian Government. The expansion of industrial activity in some cases is likely to be permanent, as it is expected that preferential treatment will be extended between Great Britain and the British Dominions, which will have a tendency to build up companies manufacturing in the British colonies.

A hint of the amount of money being distributed in Canada now is obtained from the information that the Imperial Munitions Board alone is drawing upon the credit established by the Canadian banks for the British Government at the rate of \$5,000,000 weekly. For every \$100 spent by the Munitions Board, it is estimated that \$20 goes to the United States and \$80 remains at home, and a large part of this is represented by the weekly pay-roll. Indications are that this will continue well into the autumn at least, for Toronto financial interests who are in close touch with the Munitions Committee at Ottawa report that the end of the munitions orders for Canada is by no means in sight. Meanwhile, the big steel mills at least have orders on their books sufficient to keep them operating until well on in 1917, even if no further shell contracts were allotted. It is safe to say that if the war continues, the total expenditures of this country on behalf of our own and other governments will be, as estimated, \$600,000,000 for the current calendar year.

Since the placing some weeks ago of the \$75,000,000 credit by Canada at the disposal of the British Minister of Munitions, orders have been placed by the Imperial Munitions Board for \$80,000,000 worth of munitions. The orders now placed will keep most of the munitions factories busy until well into the summer. Further large orders are expected from Great Britain early in June.

Canadian steel companies have of late made big advances in the matter of export to South African points, according to official reports. In the last eight or ten months many new shipments of goods under the heading of "iron and steel" have been made.

The reason for the increase in the capitalization of the Nova Scotia Steel & Coal Company, New Glasgow, N. S., which was authorized at the annual meeting of the company a few weeks ago, is now becoming apparent. It is now believed that the company will soon embark upon the steel shipbuilding industry. Colonel Cantley, president of the company, will address a meeting of the Canadian Manufacturers' Association at Montreal shortly, and, it is believed, he will announce the enterprise at that time, provided he secures sufficient encouragement from the Government.

The ratepayers of Port Moody, B. C., have passed a by-law to guarantee the bonds of Boyds, Ltd., Vancouver, B. C., to the extent of \$200,000. In return the company will build shipyards, and erect a machine shop and foundry there to cost \$180,000.

The Dominion Harvester Company's plant at Medicine Hat, Alberta, was destroyed by fire with a loss of \$65,000.

The General Lumber & Mfg. Company, Ltd., Sherbrooke, Que., has been incorporated with a capital stock of \$49,000 by J. D. Bush and others to manufacture wooden articles, etc.

The operations of the Granby Consolidated Mining, Smelting & Power Company, Vancouver, B. C., have recently been seriously curtailed as the result of the inability to obtain a sufficient supply of power. To overcome this the directors have decided to authorize the installation of an auxiliary power plant at the Hidden Creek Smelter to provide between 7000 and 8000 hp. additional. Orders for the machinery are to be placed in the near future. William H. Nichols, 165 Broadway, New York, N. Y., is president.

The Gurney Foundry Company, King Street West, Toronto, will build an addition to its plant on Junction Road at a cost of \$2,500.

The Onward Mfg. Company, Berlin, Ont., will build a factory at Berlin, 45 x 100 ft., three stories, for the manufac-

ture of electric vacuum cleaners, washers, etc. T. A. Witzel is proprietor.

The Flint Varnish & Color Company, Perth Avenue, Toronto, will make alterations to a factory it has secured at Perth and Kingsley avenues, and will purchase machinery. The alterations and machinery will cost \$150,000.

The Dominion Safe & Vault Company, Farnham, Que., has awarded the contract to the Concrete Stone & Coal Company, 504 Ferry Street, Niagara Falls, Ont., for the erection of a factory at Niagara Falls to cost \$7,000.

Cornwall, Ont., is contemplating installing new water-works equipment, including boiler steam pump, geared pump, turbine, etc. J. G. Harkness is town clerk.

W. M. German, Welland, Ont., is interested in a company which is to be formed under the name of the Dominion Incinerators System, Ltd., composed of Welland and Toronto capitalists. The company will construct an incinerator plant at Welland, Ont., and also at a number of the leading centers of Canada. Many by-products will be manufactured from the waste.

Bids will be received up to May 9, for the supply of two gasoline diaphragm pumps for Toronto, Ont. Specifications may be had from the Works Department Room 6, City Hall, Toronto.

The Graselli Chemical Company, Burlington Street, Hamilton, Ont., will build an addition to its factory to cost \$30,000.

The Canada Stove Company, Montreal, will build an addition to its plant. W. A. Mahoney, Guelph, Ont., is the architect.

The Begg Motor Company, 1062 Georgia Street West, Vancouver, B. C., will build an addition to its plant to cost \$15,000.

The T. Eaton Company, Ltd., 190 Yonge Street, Toronto, will build a steel and concrete factory and warehouse on Terauley Street to cost \$500,000. George W. Thompson, Louisa Street, is engineer. J. C. Eaton is president.

The Ingersoll-Rand Company, Ltd., Sherbrooke, Que., has let a contract to Anglins, Ltd., 65 Victoria Street, Montreal, for the erection of a machine shop to cost \$22,000.

Morrow & Beatty, Ltd., 415½ George Street, Peterborough, Ont., has received the contract for the erection of a power house, etc., at Smooth Rock Falls, Ont., for the Mat-tagami Pulp & Paper Company.

The Saskatchewan Bridge & Iron Works, Medicine Hat, Alberta, is contemplating the completion of its plant this year.

The Toronto Iron Works, foot of Cherry Street, Toronto, is in the market for an electrically-operated, four to five-ton stiffleg derrick, boom, 50 to 60 ft.

Weyburn, Sask., has passed a by-law authorizing the purchase of a 500-kw. turbine and equipment to cost \$35,000. George W. Reid is engineer.

H. Oakes, Lake Shore Mine, Kirkland Lake, Ont., is in the market for a 200-hp. motor, compressor, drills and pumps.

The Smith Foundry Company's plant at Fredericton, N. B., was damaged by fire with a loss of \$5,000.

The Canadian Hoskins, Ltd., Walkerville, Ont., is considering the establishing of a factory for the manufacture of a special alloy wire.

The Gutta Percha Rubber Company, Ltd., West Lodge Avenue, Toronto, is building additions to its plant to cost about \$500,000, including three buildings, the largest of which will be a plant for the manufacture of tires. The best machinery procurable will be installed.

Work has been commenced on the erection of a new shell factory for the Renfrew Machinery Company, Renfrew, Ont. Its former plant was destroyed by fire a short time ago with a loss of \$100,000.

An addition is being built to the plant of the Dominion Salt Company at Sarnia, Ont., at a cost of \$30,000. New machinery and grainers will be installed to bring the capacity up to 1500 bbl. a day.

Fire caused \$100,000 damage to the Canadian Northern Railway yards at Winnipeg, Man.

The planing mill and box factory at Fenelon Falls, Ont., owned by Reeve Tiers, was destroyed by fire with a loss of about \$30,000. It is expected that the plant will be rebuilt.

The Universal Transportation Company, Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by Andrew G. McHugh, 27 Dundonald Street; Richmond W. Hart, Traders Bank Building; Herbert C. Leggott and others to manufacture ships, boats, docks, elevators, etc.

The Chalmers Motor Company, Saskatoon, Sask., will build an addition to its plant to cost about \$500,000.

W. E. George, Gore Bay, Ont., will build a planing mill at a cost of about \$10,000.

The Toronto Type Foundry Company, Ltd., 50 Coleman Avenue, Toronto, is in the market for one 10-in. or 12 x 42-in. universal grinding machine, one 3 or 4-ft. radial drilling machine, and one tool and cutter grinding machine.

The City Council, St. John, N. B., has ratified the taxation agreement made with T. McAvity & Sons, in 1914, looking to the erection of an iron and brass foundry on Marsh Road, adjacent to the Intercolonial Railway tracks. It is understood that the company has recently been awarded an order for munitions, and that the erection of the plant will be rushed in order to fill this order. The agreement calls for the expenditure of \$100,000 the first year. This the company is prepared to do. The proposed plant, it is stated, will be one of the largest in the lower provinces.

The Sarnia Fence Company, Ltd., Sarnia, Ont., is erecting a small plant at Stillwater, Minn., which will be a branch of the United Fence Company, Port Huron, which is now operating in that city. It will be known as the United Fence Company of Minnesota. The building will be ready to start operations in a month or two. T. S. de Prendergast is assistant manager.

The Leeming Miles Company, Ltd., 4 St. Lawrence Boulevard, Montreal, is in the market for a 60-cycle, 2200-volt, 50 or 100-hp. motor.

The Automobile Owners' Accessory Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Hector F. Cameron, Joseph Jenkins, Montreal; Charles P. Lyman, Westmount, and others to manufacture automobiles, parts, equipment, motors, engines, tools, etc.

J. E. Clipsham & Sons, Ltd., Gravenhurst, Ont., has been incorporated with a capital stock of \$40,000 by William H. Clipsham, 60 Victoria Street, Toronto; Alexander W. Copper, 42 St. George Street, Walter A. Strouger, and others, of Toronto, to manufacture carriages, etc.

The Burlington Metals Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$40,000 by Reginald H. Parmenter, 85 Bay Street, William S. Morlock, 107 Roxborough Avenue; Arthur J. Thomson, and others, of Toronto, to manufacture metals, etc.

The Byrns Pneumatic Ship Raising Company, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$40,000 by Harry Byrns, William F. Condon, William H. Goff and others to manufacture machinery and apparatus for raising submerged bodies, ships, etc.

The Doyle-Denner Tractor Company, Ltd., Essex, Ont., has been incorporated with a capital stock of \$150,000 by William C. Doyle, William J. Nesbitt, Essex, Ont.; Edward C. Dennert, Detroit, Mich., and others to manufacture farm tractors, engines, etc.

The Dominion Sugar Company, Ltd., Wallaceburg, Ont., has been incorporated with a capital stock of \$5,000,000 by Charles H. Houson, Herman Wiese of Wallaceburg, Henry B. Smith of Bay City, Mich., and others. The company is building a sugar refinery at Chatham, Ont., at a cost of \$1,000,000.

The Reliance Foundry, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Emilien Daoust, Antonia Valiquette, Joseph A. St. Yves and others to manufacture machinery, pipe, tools, stoves, furnaces, metals, etc.

Arthur D. Little, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Arthur R. Holden, Pierre A. Badeaux, Ernest G. Bennett and others to manufacture machinery, implements, tools, etc.

The Feaster Corporation of Canada, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by Humbert C. G. Mariotti, Egbert W. Westover, Montreal; Charles M. Cotton and others of Westmount, Que., to manufacture moving picture machines, etc.

The Garlock Walker Machinery Company, Ltd., Toronto, has been incorporated with a capital stock of \$47,500 by James W. Bicknell, 6 Adelaide Street East; John F. MacGregor, 237 Beech Avenue; Thomas S. H. Giles and others of Toronto, to manufacture machinery, tools, iron, steel, etc.

The Snyder Snap Button & Fastener Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Harold L. Steele, 44 King Street West; Joseph M. Bullen, 21 Grenadier Road; Francis H. Hurley, 32 Aberdeen Avenue, and others of Toronto.

The Canadian Aloxite Company, Ltd., Stamford, Ont., has been incorporated with a capital stock of \$100,000 by Reginald H. Parmenter, 85 Bay Street; William S. Morlock, 107 Roxborough Avenue; Arthur J. Thompson, and others to manufacture abrasives, chemicals, explosives, etc.

ESTABL

Mac

Notab
manufact
grown in
the rapid
the steel
number o
short inte
ments of



Cleaning Rod

of this rap
Casting Co
years the o
tiplied at s
ties a floo
and equipm
with the ou
sq. ft., con
the foundr